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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
µg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
µM	micromolar; micromole(s)
ma	milliampere(s)
mCi, µCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)

ml, µl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0001 MICROSTRUCTURE OF THE PARENCHYMA IN THE AREA OF THE HEPATIC LOBULES. (Ger.) Meitner, E. R.; Proksova, E. G.; Baranova, M. (Lehrstuhl fur Histologie und Embryologie, Muzealna 6, 036 01 Martin, Czechoslovakia). *Anat. Anz.* 139 (1/2):36-57; 1976.

The problem of human and animal hepatic lobular microarchitecture is reviewed and the historic question of two-layered cords or one-layered plates is re-examined. Particular attention was devoted to the three-dimensional model, similar to the Elias reconstructions. The liver parenchyma was projected from six visual fields and the nuclei were joined by lines. In adjacent pictures, it was clearly visible that only 1-cell rows existed between the sinusoids in the majority of cases, excepting only anastomoses and certain clustered areas. These line drawings were entirely compatible with the acid phosphatase staining patterns. In spatial representation, the Remakian cords then appear as lamina or plates built up from cells which are not so much next to one another as over or under each other. The correct imagery would be of a single wall of bricks (hepatocytes) lying between two sinusoids.

0002 ELECTRON-MICROSCOPIC STUDIES ON DEVELOPING INTRAMURAL GANGLIA OF THE SMALL INTESTINE IN HUMAN AND RABBIT FETUSES. (Eng.) Daikoku, S.; Ikeuchi, C.; Miki, S. (Sch. Medicine, Tokushima Univ., Japan). *Acta Anat. (Basel)* 91(3):429-454; 1975.

The electron microscope was used to study Auerbach's plexus in developing human and rabbit small intestine, particularly the relation between morphogenesis and intestinal motility. No muscle layer was seen in the first stage of development (human, 6-7 weeks; rabbit, 12-14 days). Neuroblasts were round or oval, varying in size and in cytoplasmic appearance. Neural and glial processes (0.1-1.0 µm), with numerous tubular structures, were found abutting the neural cells. At the second stage, (human, 8-9 weeks; rabbit, 15-18 days), the Auerbach's plexus with ganglia was spread over the outside of the muscle layer and bidirectional peristalsis occurred. Three types of synaptic profiles were seen: (a) little membrane specificity on the synaptic portion; (b) small flattened vesicles; and (c) small round vesicles. The third stage (human, 10-12 weeks; rabbit, 20 days), showed development of the longitudinal muscle layer and nerve terminals containing mainly cored vesicles of two types: large (1,100-1,300 A) homogeneous dense granules with a limiting membrane, and numerous medium-sized (500-900 A) vesicles with a dense core and smaller sized vesicles (400-600 A) of slightly electron-opaque material. By the fourth stage (human, 27-30 weeks; rabbit, 26-31+ days) antiperistalsis no longer occurred. A new type of nerve terminal could be distinguished at this phase, one with dense, axoplasmic ground matrix, densely packed with cored vesicles (600-1300 A). The physiological significance of the different types of nerve terminals remains to be determined.

0003 ABOUT ARGENTAFFINITY AND ARGYROPHILIA OF CERTAIN ENDOCRINE GLANDS OF THE DIGESTIVE MUCOSAS. (Fre.) LeFranc, G.; Pradal, G.; L'Hermite, A.; Tusques, J. (Laboratoire d'Histologie et Embryologie, Faculte de Medecine, 44 Nantes, France). *Ann. Histochim.* 20(1):67-76; 1975.

The effect of amine loading on the argentaffin and argyrophilic properties of mucosal glands in the gastrointestinal tracts of rabbits and mice was examined. The fluorescence of endocrine gland cells (Falck's technique) in mice and in fetal, neonatal, and adult rabbits, which had or had not received L-Dopa, was compared relative to reductive, argentaffin, and argyrophilic response. These studies on cell differentiation showed that, although L-Dopa can potentiate or diminish the argentaffin sensitivity of a cell, its presence is neither necessary nor sufficient in the reduction of silver salts. The effect is nonspecific, since argyrophilia can also be potentiated or decreased.

0004 ULTRASTRUCTURAL ASPECT OF HUMAN AND MURINE DUODENAL EXPLANTS MAINTAINED IN CULTURE TYPICAL FOR THE ORGAN FOR 24 HR [Abstract]. (Fre.) Ferland, S.; Berteloot, A.; Maestracci, D.; Hugon, J. S. (Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, P.Q. J1H 5N4, Canada). *J. Microsc. Biol. Cell.* 23(2):46-47; 1975.

0005 HISTOLOGICAL EFFECTS OF DUCTAL LIGATION OF SALIVARY GLANDS OF THE CAT. (Eng.) Harrison, J. D.; Garrett, J. R. (King's Coll. Hosp. Dental Sch., London SE5 8RX, England). *J. Pathol.* 118(4):245-254; 1976.

0006 VEGETATIVE INNERVATION OF THE ESOPHAGUS: IV. ENDINGS IN THE TELA SUBMUCOSA AND TUNICA MUSCULARIS. (Eng.) Pedrosa, J. A.; Hernandez, C. J.; Rodrigo, J.; Vidal, M. A. (Instituto Cajal, CSIC, C/Velazquez 144, Madrid 6, Spain). *Acta Anat. (Basel)* 95(3):452-467; 1976.

0007 ARCHITECTURE OF THE MUSCULATURE AT THE GASTROESOPHAGEAL JUNCTION AND IN THE FUNDUS. (Eng.) Liebermann-Meffert, D. (Kantonsspital, Univ. Basel, Basel, Switzerland). *Chir. Gastroenterol.* 9(4):425-429; 1975.

0008 INTESTINAL DISTRIBUTION OF CRYSTAL-LIKE AND CRYSTAL CONTAINING CELLS IN THE RAT

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

AND MOUSE. (Spa.) Gonzalez-Licea, A. (Departamento de Investigacion en Medicina Experimental, Centro Medico Nacional, Instituto Mexicano del Seguro Social, Apdo. Postal 73-032 Mexico 12, D.F.). *Arch. Invest. Med.* 7(1):49-56; 1976.

0009 CHOLINERGIC INNERVATION OF THE SIMIAN OXYNTIC GASTRIC MUCOSA. (Eng.) Lechago, J.; Barajas, L. (UCLA Sch. Medicine, Torrance, CA 90509). *Am. J. Anat.* 147(1):147-152; 1976.

0010 ALDEHYDE-FUCHSIN STAINING OF ANTRAL ENDOCRINE CELLS. (Eng.) Ghiringhello, B.; Bussolati, G. (II Istituto di Anatomia ed Istologia Patologica, Univ. Torino, Via Santena 7, 1-10126 Torina, Italy). *Histochemistry* 48(2):145-152; 1976.

0011 ULTRASTRUCTURAL STUDY OF THE ERYTHROPOIETIC EVENTS IN HUMAN EMBRYONIC LIVERS. (Eng.) Djaldetti, M.; Ovadia, J.; Bessler, H.; Fishman, P.; Halbrecht, I. (Hasharon Hosp., Petah Tiqva, Israel). *Biol. Neonate* 26(5/6):367-374; 1975.

0012 AGE-RELATED CHANGES IN HEPATIC FINE STRUCTURE: A QUANTITATIVE ANALYSIS. (Eng.) Schmucker, D. L. (Veterans Admin. Hosp., San Francisco, CA). *J. Gerontol.* 31(2):135-143; 1976.

0013 A MORPHOMETRIC STUDY OF THE DENSITY OF MITOCHONDRIAL CRISTAE IN HEART AND LIVER OF AGING MICE. (Eng.) Tate, E. L.; Herbener, G. H. (Univ. Louisville Sch. Medicine, Health Sciences Center, Louisville, KY 40201). *J. Gerontol.* 31(2):129-134; 1976.

0014 ELECTRICAL SIZING OF LIVER CELL NUCLEI BY THE PARTICLE BEAM METHOD. MEAN VOLUME, VOLUME DISTRIBUTION AND ELECTRICAL RESISTANCE. (Eng.) Valet, G.; Silz, S.; Metzger, H.; Ruhenstroth-Bauer, G. (Max-Planck-Institut fur Biochemie, 8033 Martinsried b. Munchen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(5):274-281; 1975.

0015 THE ROLE OF CATIONS AND SUPERFICIAL MEMBRANE PROTEINS IN THE RAT LIVER PARENCHYMA CELL ADHESION. II. EFFECTS OF CA^{2+} IONS ON THE STRUCTURE OF CELLULAR CONTACTS. (Rus.) Komissarchik, I. I.; Snigirevskaia, E. S.; Vinnichenko, L. N.; Ivanovskaia, E. G. (Inst. Cytology, Acad. Sci. Leningrad, USSR). *Tsitologiia* 18(5):575-579; 1976.

See also, 0175, 0197, 0200, 0210, 0212, 0229, 0296, 0570.

ABSORPTION - EXCRETION - TRANSPORT

0016 ABSORPTION OF AMINO ACIDS AND PEPTIDES FROM A COMPLEX MIXTURE IN THE ISOLATED SMALL INTESTINE OF THE RAT. (Eng.) Gardner, M. L. G. (Univ. Edinburgh Medical Sch., Teviot Place, Edinburgh, EH8 9AG, Scotland). *J. Physiol. (Lond.)* 253(1):233-256; 1975.

To gain information on the relative physiological importance of peptide and amino acid absorption, the absorption of 16 amino acids, both free and peptide-bound, was measured in the isolated perfused rat small intestine from a pancreatic partial digest of casein. The perfusate included the following amino acids at concentrations from 20 to 500 µM: aspartic acid, threonine, serine, glutamic acid, proline, glycine, alanine, valine, methionine, isoleucine, leucine, tyrosine, phenylalanine, histidine, lysine, and arginine. The rate of absorption of each acid was closely proportional to its concentration in the perfusate, implying a constant V_{max}/K_m ratio for all amino acids in the mixture. There was a high correlation between the compositions of luminal perfusate and secretion into the tissue fluid (apart from the content of glutamic and aspartic acids and alanine). The concentrations of each free amino acid were, on the average, nine times as great in secretion as in the lumen; the total peptide-N concentration in secretion was approximately four times that in the lumen. The rate of absorption of each free amino acid ($p<0.001$) was highly negatively dependent on the rate of absorption of that amino acid in peptide-bound form ($p<0.001$), in addition to being positively dependent on the perfusate concentration of free amino acid. Peptide-bound proline appeared to be well absorbed; free proline liberated by hydrolysis appeared to pass back into the lumen as well as into the tissue fluid. About one-third of the amino acids appearing in the secretion on the serosal surface were peptide-bound. The results suggest that the rate of absorption of peptides determines the rate of their hydrolysis, which probabl occurs mainly after entry into the mucosal cells.

0017 KINETICS OF THE SUBCELLULAR DISTRIBUTION OF IRON AND COBALT IN THE INTESTINAL MUCOSA OF THE RAT. (Eng.) Thomson, A. B. R.; Valberg, L. S. (Dept. Medicine, Clinical Sciences Bldg., Univ. Alberta, Edmonton, Alberta, Canada T6G 2G3). *Am. J. Dig. Dis.* 21(4):305-312; 1976.

The subcellular distribution of labeled Fe and Co in Fe-deficient rats (FeD), in which transport was active, was compared by a differential centrifugation technique with that in Fe-loaded rats (FeL), in which transport was by diffusion. Solutions containing either Fe or Co in concentrations varying from 0.1 to 10.0 mM were perfused for 30 min through duodenal loops of FeD and FeL rats. In FeL rats, a linear relation was observed between the concentration of metal in the perfusate and the amount of Fe and Co in each subcellular fraction. More Fe and Co was present in each fraction from FeD animals than from FeL animals. The addition of 2 mM Co to the Fe perfusate reduced the uptake and transfer of Fe, with a reduction ($p<0.05$) in the amount of Fe in fractions I and II at concentrations of 2, 5, and 10 mM. The addition of Fe, varying from 0.1 to 10 mM, to the 2-mM perfusate of Co caused a reduction in Co uptake and transfer and a reduction ($p<0.05$) in the amount of Co in fractions II-V. The average amount of Fe in the mucosa of the duodenum of FeL animals was 108 ± 32 nmol, as compared to 219 ± 27 nmol in normal animals. The increase was due to the presence of more Fe in fractions I and II ($p<0.05$). In FeD animals, there was a further increase in the amount of Fe in the mucosa (595 ± 63 nmol). The average amount of Co in the mucosa was 228 ± 49 nmol, most of which was in fraction V. Although there is an overlap in the fractions prepared by differential centrifugation, the specific subcellular composition of each fraction was not identified in this experiment. This centrifugation technique is useful, however, for indicating which crude fractions should be subsequently examined by a more sensitive technique. The results suggest that a constituent(s) in the particulate fractions I and II is involved in the enhanced absorption of Fe in FeD animals. The subcellular fraction responsible for the increased Co absorption in FeD rats was not identified.

0018 TRANSPORT OF SODIUM AND POTASSIUM IN INTESTINAL EPITHELIAL CELLS. (Eng.) Rose, R. C. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Coll. Medicine, Hershey, PA 17033). *Life Sci.* 18(11):1229-1236; 1976.

Transport properties of rabbit small intestinal mucosa were investigated *in vitro* to characterize the process by which epithelial cells maintain normal Na and K gradients across the cell membrane. Individual samples of freshly excised ileal mucosa were incubated in HCO_3-buffer or in K-free buffer, and the intracellular Na concentration was determined. The intracellular Na concentration was reduced more rapidly ($p<0.01$) in the presence of K than in its absence. Tissue incubated in the presence of Na accumulated K at a significantly greater rate ($p<0.05$) than tissue incubated in Na-free buffer. Following preincubation at 0 C in K-free buffer to reduce the K concentration, a greater transmural electrical potential difference (+0.92 ± 0.4 mV) and short circuit current (+45 ± 18 $\mu amp/cm^2$, $p<0.01$) developed as the temperature was increased to 37 C, if K_2 (10 mEq/l) was present in the bathing solution. The potential difference and short circuit current, which generally reflect the rate of active Na transport in the ileum under control conditions, increased immediately upon raising the K concentration in the serosal solution from 0 to 10 mM. The results present the first direct indication in mammalian intestine of an interdependence of the Na and K active transport processes, which regulate the intracellular content of these cations.

0019 GASTROINTESTINAL ABSORPTION. I. MECHANISMS. (Eng.) Blanchard, J. (Coll. Pharmacy, Univ. Arizona, Tucson, AZ 85721). *Am. J. Pharm.* 147(5):135-146; 1975.

0020 PROTEIN DIGESTION AND ABSORPTION BY THE ENTIRE GASTROINTESTINAL TRACT IN MAN. (Eng.) Phillips, R. A. (Dept. Epidemiology, Washington Univ., Seattle, WA). [available through National Technical Information Services, Washington, DC, Document No. AD-A007 627/3WJ]. 16 pp., 1975.

0021 INFLUENCE OF CHELATING AGENTS ON THE GASTROINTESTINAL ABSORPTION OF LEAD. (Eng.) Jugo, S.; Maljkovic, T.; Kostial, K. (Coney Island Hosp., 2601 Ocean Parkway, Brooklyn, NY 11235). *Toxicol. Appl. Pharmacol.* 34(2):259-263; 1975.

0022 INFLUENCE OF EXPERIMENTAL DESIGN ON KINETIC STUDIES OF HUMAN INTESTINAL ABSORPTION IN VIVO [Abstract]. (Eng.) Mary, J. Y.; Bernier, J. J. (INSERM U-54, Paris, France). *Digestion* 13(3):181; 1975.

0023 JEJUNAL ABSORPTION AND METABOLISM OF BRANCHED CHAIN (BC) AMINO ACIDS (AAs) AND THEIR KETO-ANALOGUES (KAs) [Abstract]. (Eng.) Weber, F. L.; Maddrey, W. C.; Walser, M. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Clin. Res.* 23(4):521A; 1975.

0024 NEW EVIDENCE FOR INTACT DI- AND TRIPEPTIDE ABSORPTION [Abstract]. (Eng.) Fairclough, P. D.; Silk, D. B. A.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Gut* 16 (10):843; 1975.

0025 CURRENT CONCEPTS OF INTESTINAL FAT ABSORPTION. (Ger.) Gangl, A. (Ordinariat fur Gastroenterologie der Universitat, Garnisongasse 13, A-1097 Vienna, Austria). *Leber Magen Darm* 5(6):265-268; 1975.

0026 EFFECT OF DEOXYCHOLATE AND OXYPHENISATIN ON ISOLATED RAT COLONIC MUCOSA [Abstract]. (Eng.) Wanitschke, R.; Soergel, K. H. (Inst. Pharmacology, Univ. Saarland, Homburg, W. Germany). *Clin. Res.* 23(4):520A; 1975.

0027 INHIBITION OF INTESTINAL SUGAR TRANSPORT BY PHENFORMIN. (Eng.) Bolufer, J.; Lasheras, B. (Departamento de Fisiologia Animal, Universidad de Navarra, Pamplona, Spain). *Rev. Esp. Fisiol.* 31(4):251-254; 1975.

0028 GLUCOSE ABSORPTION IN THE PRESENCE OF BILE ACID, FATTY ACID AND MANNITOL INDUCED FLUID SECRETION IN THE HUMAN JEJUNUM [Abstract]. (Eng.) Ammon, H. V. (Veterans Admin. Center, Wood, WI). *Clin. Res.* 23(4):480A; 1975.

0029 EFFECT OF SUGARS AND CATIONS ON THE SMALL INTESTINE TRANSEPITHELIAL PD IN MAN [Abstract]. (Eng.) Salas-Coll, C. A.; Blendis, L. M.; Edmonds, C. J. (Central Middlesex Hosp., Middlesex, England). *Gut* 16(10):844; 1975.

0030 EFFECT OF ETHANOL (ETH) ON SODIUM DEPENDENT GLUCOSE (GI) TRANSPORT IN JEJUNUM [Abstract]. (Eng.) Beck, I. T.; Dinda, P. K.; Beck, M.; McElligott, T. F. (Queen's Univ., Kingston, Ontario K7L 3H6, Canada). *Digestion* 13(3):163-164; 1975.

0031 UPTAKE OF IRON (Fe) IN VITRO BY ISOLATED RAT DUODENAL MUCOSAL CELLS [Abstract]. (Eng.) Savin, M. A. (Univ. Kansas Medical Center, Kansas City, KS). *Clin. Res.* 23(4):488A; 1975.

0032 EFFECTS OF DIFFUSIONAL FORCES ON Na TRANSPORT ACROSS RABBIT ILEUM [Abstract]. (Eng.) Desjeux, J. F.; Tai, Y. H.; Curran, P. F. (Hopital Herold, F-75019 Paris, France). *Digestion* 13(3): 166; 1975.

0033 EFFECT OF MATURATION ON Na$^+$ TRANSPORT BY THE SMALL INTESTINE IN RABBITS [Abstract]. (Eng.) Gall, D. G.; Chapman, D.; Hamilton, J. R. (Hosp. Sick Children, Toronto, Canada). *Clin. Res.* 23(5):621A; 1975.

0034 ALTERATIONS OF INTESTINAL ION TRANSPORT BY HORMONES AND BACTERIAL ENTEROTOXINS: CORRELATIONS WITH CYCLIC NUCLEOTIDE LEVELS [Abstract]. (Eng.) Field, M.; Brasitus, T. A.; Sheerin, J. E.; Kimberg, V. (Harvard Medical Sch., Beth Israel Hosp., Boston, MA). *Digestion* 13(1/2):109; 1975.

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0036 EFFECTS OF ALCOHOL ON ACTIVE AND PASSIVE ION TRANSPORT BY GASTRIC MUCOSA [Abstract]. (Eng.) Fromm, D.; Robertson, R. (Harvard Medical Sch., Boston, MA). *Surg. Forum* 26:376-377; 1975.

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0040 HEPATIC STORAGE AND BILIARY TRANSPORT MAXIMUM OF SODIUM TAUROCHOLATE IN THE DOG [Abstract]. (Eng.) Poupon, R.; Poupon, R.; Dumont, M.; Duval, M.; Erlinger, S. (Hopital Beaujon, Clichy, France). *Digestion* 12(4/6):262; 1975.

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0042 HEPATIC TRANSPORT OF ORGANIC CATIONS: INFLUENCE OF BILE SALT CHOLERESIS [Abstract]. (Eng.) Vonk, R. J.; Scholtens, E.; Keulemans, K.; Meijer, D. K. F. (Dept. Pharmacology, State Univ. Groningen, Groningen, Netherlands). *Digestion* 12(4/6):357-358; 1975.

0043 COLCHICINE INHIBITS FIBRINOGEN TRANSLOCATION IN THE ENDOPLASMIC RETICULUM OF THE HEPATOCYTES [Abstract]. (Eng.) Feldmann, G.; Maurice, M. (INSERM U-24, Hopital Beaujon, F-92110 Clichy, France). *Digestion* 13(3):168; 1975.

0044 THE ELECTROLYTE AND WATER CONTENTS IN THE FROG GALLBLADDER WALL DURING ABSORPTION OF ISOTONIC FLUID. (Rus.) Iaremenko, M. S.; Butussova, I. A. (Bogomolets Inst. Physiology, Ukrainian SSR Acad. Sciences, Kiev, USSR). *Fiziol. Zh. SSSR* 62(2):275-282; 1976.

0045 ACTION OF SECRETAGOGUES ON Ca^{++} TRANSPORT IN ISOLATED PANCREATIC CELLS. (Eng.) Kondo, S.; Schulz, I. (Max-Planck-Institut fur Biophysik, Frankfurt/Main, W. Germany). *Biol. Gastroenterol. (Paris)* 8(4):354-355; 1975.

See also, 0776.

0046 INHIBITORY EFFECTS OF ADENINE NUCLEOTIDE ANALOGS ON THE ISOLATED GUINEA-PIG TAENIA COLI.

(Eng.) Satchell, D. G.; Maguire, M. H. (Dept. Zoology, Univ. Melbourne, Parkville, Victoria, Ausralia). *J. Pharmacol. Exp. Ther.* 195(3):540-548; 975.

he inhibitory actions of ADP, AMP, adenosine, and 6 adenine nucleotide and nucleoside analogs on solated guinea pig taenia coli preparation were comared with those of ATP. Responses were quantitated s the magnitude of maximal relaxation, time taken o reach maximal relaxation, and activity relative o that of ATP. Inhibitory responses induced by the '-di- and triphosphates of 2-chloroadenosine and -methyl-thioadenosine resembled those elicited by DP and ATP, but the 2-substituted analogs were arkedly more potent. AMP and adenosine were less ctive than ATP; their activities were enhanced by -chloro substitution but not by 2-methylthio subtitution. 2-Methylthio-AMP and 2-methylthioadenosine ere the only analogs that did not elicit maximal elaxation of the taenia coli. 6'-Deoxyhomoadenosine '-phosphonic acid was inactive. Adenine nucleotide nalogs in which the polyphosphate moiety was modiied had steeper log dose-response curves and inuced greater maximal responses than ATP. Analogs n which the polyphosphate α,β-anhydride oxygen as replaced by methylene took up to five times onger than ATP to cause maximal relaxation. Other nalogs with modified or unmodified polyphosphate ide chains caused rapid relaxation of the taenia oli. There was no apparent correlation between reative activity and time to reach maximal response. he findings indicate that di- or triphosphate groupngs are of prime importance in binding adenine nuleotides to the putative smooth muscle receptor that ediates their inhibitory responses, and that hyrolysis of the terminal phosphates of adenosine '-polyphosphates is not a requirement for inhibitory ctivity.

047 EFFECT OF METOCLOPRAMIDE ON MYOELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED ANINE STOMACH PERFUSED EXTRACORPOREALLY.

(Eng.) owalewski, K.; Kolodej, A. (Surgical-Medical Res. nst., Univ. Alberta, Edmonton, Alberta T6G 2N8, anada). *Pharmacology* 13(6):549-562; 1975.

ne effect of metoclopramide on myoelectrical and echanical activity was studied in the totally isoated canine stomach, perfused extracorporeally. ne stomachs were perfused with homologous blood f living supporting dogs. Drugs were administered irectly into the arterial system of the isolated tomachs, either as flash injections or as constant nfusions. Flash injections of metoclopramide (2.5 g) led to the response activity (spiking) and associated mechanical response. Electrical control ctivity was also affected by metoclopramide; the hanges consisted of premature control activity and ncoupling. Similar reactions were observed after flash injections of 5 µg methacholine, 5 µg pentagastrin, or electrical stimulation (15V 8 Hz 5 msec) of the Latarjet nerve. These reactions were dose-dependent. When given as a constant infusion, tetrodotoxin (100 µg/hr for 30 min), atropine (0.2 mg/hr for 10 min), hexamethonium (150 mg/hr for 15 min), and glucagon (5 mg/hr for 40 min) inhibited the action of metoclopramide on myoelectrical and mechanical activities of the isolated stomach. Inhibitions of the responses to metoclopramide by atropine and tetrodotoxin implicate acetylcholine in the mediation of these responses. The ability of hexamethonium to diminish the response to metoclopramide suggests that a locus of action may be at both pre- and post-ganglionic sites of the intramural plexus. Exact receptors of this action were not demonstrated.

0048 CONTRACTION OF ISOLATED BRUSH BORDERS FROM THE INTESTINAL EPITHELIUM.

(Eng.) Rodewald, R.; Newman, S. B.; Karnovsky, M. J. (Dept. Biology, Univ. Virginia, Charlottesville, VA 22901). *J. Cell Biol.* 70(3):541-554; 1976.

The contraction of brush borders isolated from the epithelial cells of the small intestine of neonatal rats was studied by light and electron microscopy. These brush borders were able to contract in the presence of ATP and Mg^{2+}; Ca^{2+} was not required. Contraction was characterized by a pinching-in of the plasma membrane in the region of the zonula adherens and a subsequent rounding of the brush borders. No movement or consistent shortening of the microvilli was observed. The most noteworthy feature of the internal contents of the brush borders was the large number of the microfilaments. Three groups of filaments were differentiated: core filaments of the microvilli, terminal web filaments, and tonofilaments. The contraction appeared to involve the 5- to 7-nm diameter microfilaments in the terminal web, which were associated with the zonula adherens. After exposure to meromyosin (HMM, 2 mg/ml) for 30 min, both the core filaments of the microvilli and the terminal web filaments bound HMM. If it is assumed that the core filaments of the microvilli and the terminal web filaments associated with the zonula adherens exhibit the same polarity with regard to their respective attachment sites on the plasma membrane, then the interaction of these filaments with myosin molecules in the terminal web would generate tension between the zonula adherens and the tips of the microvilli. With isolated brush borders, the tension would cause a contraction confined primarily to the terminal web, with a contraction like that seen in this study. It is postulated that in the intact tissue, the zona adherens, by virtue of its location within the junctional complex between cells, is most likely restrained from appreciable movement; the tension exerted within the terminal web might be sufficient to overcome the rigidity of the microvillar membranes and cause shortening of the microvilli.

0049 SUITABILITY OF BARIUM SULFATE TABLETS FOR EVALUATION OF MOTOR ACTIVITY OF THE ALIMENTARY TRACT AFTER SURGERY. (Pol.) Janicki, S.; Wajda, Z. (Zaklad Farmacji Stosowanej Instytutu Technologii i Analizy Leku AM, ul. Karola Marksa 107, 80-416 Gdansk-Wrzeszcz, Poland). *Pol. Tyg. Lek.* 31(9):353-355; 1976.

0050 EFFECTS OF BICARBONATE PERFUSION ON LOWER ESOPHAGEAL SPHINCTER RESPONSE TO FEEDING [Abstract]. (Eng.) Maher, J. W.; Hollenbeck, J. I.; Sierakowski, N.; Woodward, E. R.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL). *Surg. Forum* 26:366-368; 1975.

0051 THE LOWER ESOPHAGEAL SPHINCTER (LES) AS A BARRIER TO GASTRO-ESOPHAGEAL (GE) REFLUX [Abstract]. (Eng.) Lobis, I. F.; Malmud, L. S.; Roberts, G. S.; Fisher, R. S. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Clin. Res.* 23(4):482A; 1975.

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0054 EXPERIMENTAL INVESTIGATION OF THE MOBILITY OF DIFFERENT PARTS OF THE INTESTINE. (Eng.) Ritter, U. (Medical Acad., Lubeck, W. Germany). *Am. J. Proctol.* 26(6):53-54; 1975.

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0056 ACTIONS OF CYCLIC AMP AND DIBUTYRYL CYCLIC AMP ON THE ELECTRICAL AND MECHANICAL ACTIVITIES OF THE CAT SMALL INTESTINE. (Eng.) Ohkawa, H. (Yamaguchi Univ. Sch. Medicine, Ube, Japan). *Bull. Yamaguchi Med. Sch.* 22(2):185-196; 1975.

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0062 DOPAMINE AND THE ACTION OF MORPHINE ON THE GUINEA-PIG ILEUM [Abstract]. (Eng.) Heimans, R. L. H. (Dept. Pharmacology, Univ. Otago Medical Sch., Otago, New Zealand). *Proc. Univ. Otago Med. Sch.* 53(3):68-70; 1975.

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0065 RESPONSES OF THE ISOLATED SPHINCTER OF ODDI FROM THE GUINEA-PIG TO FIELD STIMULATION [Abstract]. (Eng.) Brooks, S.; Halliday, J.; Paterson, G. (Dept. Pharmacology, King's Coll., London, England). *Br. J. Pharmacol.* 55(2):270P; 1975.

0066 EFFECT OF SOMATOSTATIN ON MOTILIN LEVELS AND GASTRIC EMPTYING [Abstract]. (Eng.)

Bloom, S. R.; Ralphs, D. N.; Besser, G. M.; Hall, R.; Coy, D. H.; Kastin, A. J.; Schally, A. V. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London, England). *Gut* 16(10):834; 1975.

0067 EFFECTS OF SECRETIN, GLUCAGON AND CHOLECYSTOKININ (CCK) ON ANTRAL AND PYLORIC MOTOR ACTIVITY IN MAN. ENDOSCOPIC AND MANOMETRIC OBSERVATIONS [Abstract]. (Eng.) Chey, W. Y.; Palacios, G.; Shah, A. N. (Genesee Hosp., Rochester, NY). *Gastrointest. Endosc.* 21(4):185-186; 1975.

0068 THE SLOW WAVE IN THE CIRCULAR MUSCLE OF THE GUINEA-PIG STOMACH. (Eng.) Ohba, M.; Sakamoto, Y.; Tomita, T. (Sch. Medicine, Fukuoka Univ., Fukuoka 814, Japan). *J. Physiol.* 253(2):505-516; 1975.

0069 ACTION OF CAERULEIN ON GALLBLADDER AND GASTROINTESTINAL MOTILITY AND ITS CLINICAL APPLICATION [Abstract]. (Eng.) Tsuneoka, K.; Katsuta, N.; Kawarazaki, M.; Sesoko, M.; Kobayashi, M.; Komine, Y.; Okabe, Y. (Nippon Medical Sch., Tokyo, Japan). *Jpn. J. Med.* 14(2):115-116; 1975.

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SECRETION AND METABOLISM

0071 THE INHIBITORY INFLUENCE OF THE PYLORIC ANTRUM ON GASTRIC SECRETION IN DOGS. (Eng.) Hunt, D. R.; Forrest, A. P. M. (Welsh National Sch. Medicine, Cardiff, Wales). *Aust. J. Exp. Biol. Med. Sci.* 54(1):79-89; 1976.

The effects of denervation of the pyloric antrum and of subsequent vagotomy on the secretory responses of an innervated or a denervated gastric pouch to histamine and pentagastrin were determined in mongrel dogs. Each animal received seven doses of 5, 10, 20, 40, 80, 160, and 320 μg histamine base/kg/hr as histamine acid phosphatase or 0.5, 1, 2, 4, 8, 16, and 32 μg/kg/hr of pentagastrin by continuous i.v. infusion at a rate of 21.4 ml/hr. In dogs with innervated gastric pouches, maximal acid output was produced by 160 μg/kg/hr histamine, although in any single test, the peak sometimes occurred at the dose above or below this level. The same pattern occurred after denervation of the antrum, but the output of acid was significantly greater at all doses above 20 μg/kg/hr. For the pentagastrin stimulus, 0.5 μg/kg/hr evoked a response during control tests, with the peak output at 32 μg/kg/hr. In animals with denervated pouches, the acid output steadily increased with histamine and peaked at either 160 or 320 μg/kg/hr. There was a significant increase in acid sensitivity to high doses of pentagastrin, and the peak was achieved with 8 μg/kg/hr after denervation. In dogs with denervated pouches, vagotomy produced a highly significant increase in maximal acid output following histamine and pentagastrin. Vagotomy did not increase the secretory effect in dogs with innervated pouches. It is not possible to postulate a single mechanism to account for these results, but they are in keeping with the view that the vagal innervation of the stomach has an inhibitory, as well as a stimulatory, role in gastric secretion.

0072 NORMAL DISTRIBUTION AND POSTPRANDIAL RELEASE OF GUT HORMONES. (Eng.) Bloom, S. R.; Bryant, M. G.; Polak, J. M.; Cochrane, J. P. S. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London W 12, England). *Biol. Gastroenterol. (Paris)* 8(4):358; 1975.

0073 DYNAMIC CHANGES OF THE LUMINAL PLASMALEMMA IN STIMULATED PAROTID ACINAR CELLS: A FREEZE-FRACTURE STUDY. (Eng.) De Camilli, P.; Peluchetti, D.; Meldolesi, J. (Dept. Pharmacology, Univ. Milano, 20129 Milano, Italy). *J. Cell Biol.* 70(1):59-74; 1976.

0074 THE ROLE OF LUMINAL CONTENTS IN INTESTINAL ADAPTATION [Abstract]. (Eng.) McCarthy, D. M.; Nicholson, J. A.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA). *Clin. Res.* 24(3):289A; 1976.

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0076 ALBUMIN SYNTHESIS AND EFFECT OF BETAMETHASONE ON ALBUMIN SYNTHESIS IN PERFUSED LIVER OF NORMAL AND CCl_4-INTOXICATED RATS. (Eng.) Okuyama, S.; Kakumu, S.; Kato, Y.; Inagaki, T.; Ito, S. (Nagoya Univ. Sch. Medicine, 65, Tsuruma-cho, Showa-ku, Nagoya, 466 Japan). *Gastroenterol. Jpn.* 10(4):271-282; 1975.

0077 MODERN VIEWS CONCERNING GASTRIN, TOGETHER WITH SOME PERSONAL FINDINGS. (Ita.) Giordano, G.; Marugo, M.; Bertolotto, E. (Istituto Scientifico di Medicina Interna, Universita di Genova, Genova, Italy). *Minerva Gastroenterol.* 21(4):189-211; 1975.

See also, 0061, 0085, 0108, 0113, 0117, 0170, 0206, 0217, 0295.

SECRETION AND METABOLISM

Stomach

0078 CHANGES IN MUCOSAL AND VENOUS HISTAMINE CONCENTRATIONS DURING INSTILLATION OF ETHANOL IN THE CANINE STOMACH. (Eng.) Dinoso, V. P., Jr.; Chuang, J.; Murthy, S. N. S. (Hahnemann Medical Coll. and Hosp., 230 North Broad St., Philadelphia, PA 19102). *Am. J. Dig. Dis.* 21(2):93-97; 1976.

Histamine concentrations in the gastric mucosa, gastric venous blood, and gastric contents were measured after the instillation of 300 ml of 40%, 20%, and 12.5% (volume/volume) ethanol intragastrically for 30 min in anesthetized mongrel dogs. The mean histamine concentration in all areas in dogs treated with 40% ethanol was significantly higher ($p<0.05$) than in dogs treated with NaCl. Serial studies of the gastric venous blood of the ethanol-treated dogs showed significant elevations of histamine concentrations for 2 hr after instillation of 40% ethanol ($p<0.05$). There was less of an increase at 20 and 30 min after instillation of 12.5% and 20% ethanol, resp. The mean concentrations of histamine in the gastric contents of the NaCl-treated dogs and in those treated with 40% ethanol were 0.2 μg/ml and 0.92 μg/ml, resp. No change was observed after administration of 50% glucose and 25% mannitol. Morphologically, the gastric mucosa of the ethanol-treated dogs was edematous, congested, and hemorrhagic. The severity of these changes increased with the concentration used. The results indicate that topical application of 40% ethanol increases the concentration of histamine in the gastric mucosa. However, the precise role of histamine in the pathogenesis of ethanol-induced mucosal damage requires further study.

0079 A COMPARISON OF THE PEPSIN STIMULATING EFFECTS OF SECRETIN PREPARATIONS. (Eng.) Braganza, J. M.; Howat, H. T.; Kay, G. H. (Manchester Royal Infirmary, Manchester M13 9WL, England). *J. Physiol. (Lond.)* 258(1):63-72; 1976.

The peptic responses to Boots, GIH, and synthetic secretins were compared in fasting anesthetized cats in which the pylorus and bile duct were occluded to prevent the release of duodenal hormones by acid and bile salts. A quantity of dilute acid introduced into the stomach at regular intervals ensured the total recovery of viscid secretions and preserved peptic activity. Boots secretin was infused in doses of 2, 4, 8, 16, and 32 Crick, Harper, Raper (C.H.R.) U/kg/hr, while the doses of GIH were 0.5, 1, 2, 4, 8, and 16 clinical units (C.U)/kg/hr. The mean output of pepsin obtained in response to Boots secretin (8 and 16 C.H.R. U/kg/hr) was significantly greater ($p<0.02$ and $p<0.01$, resp.), than the mean pepsin output obtained in response to GIH secretin, (2 and 4 C.U./kg/hr, resp.). The observed maximal peptic response to Boots secretin (16 C.H.R. U/kg/hr) was three times greater than the observed maximal response to GIH secretin (16 C.U./kg/hr). Atropine sulfate (1 mg/kg, i.v.) did not inhibit the peptic response. Synthetic secretin in doses of 4 C.U./kg/hr, GIH secretin 4 C.U./kg/hr and GIH secretin 4 C.U./kg/hr together with cholic acid 0.8 mg/kg/hr, and Boots secretin 16 C.H.R. U/kg/hr, were infused successively. The output of pancreatic juice and lipase remained constant throughout. However, the output of pepsin increased sharply to 800 U/15 min when Boots secretin was given, and the output of acid increased by approximately 100 μEq/15 min. The possibility that a vasodilator substance is present in Boots secretin, which by expanding the splanchnic bed increases the concentration of secretin at target sites in the stomach and pancreas, seems unlikely, as the flow of pancreatic juice does not increase proportionately with the vast increase in pepsin.

0080 BASAL AND MAXIMAL GASTRIC ACID SECRETION IN HEALTHY CHILDREN AGED 3 TO 15 YEARS. (Pol.) Mryglodowicz, A. (II Klinika Chorob Dzieci Instytutu Pediatrii AM, ul. Swierczewskiego 1/6, 80-803 Gdansk, Poland). *Pol. Tyg. Lek.* 31(9):357-360; 1976.

0081 REGULARITY FACTORS OF GASTRIC EMPTYING IN THE DOG. (Ger.) Krejs, G. J.; Hegglin, J.; Sauberli, H.; Largiader, F.; Schmid, P.; Blum, A. L. (Spital, Bergstrasse 16, CH-8805 Richterswil, Switzerland). *Helv. Chir. Acta* 43(1/2):179-182; 1976.

0082 AUTORADIOGRAPHY OF THE REGENERATION OF THE GASTRIC MUCOSA AFTER A MASSIVE BLOOD LOSS. (Rus.) Potashov, L. V.; Berlin, L. B.; Klimashevski, V. F.; Sedov, V. M. (Dept. of Surgery, 'ac. of Stomatology, I. P. Pavlov First Leningrad ledical Inst., Leningrad, USSR). *Arkh. Anat. Gistol. mbriol.* 70(2):65-68; 1976.

)083 GASTRIC SECRETORY STUDIES IN THE RHESUS MONKEY: THE RELATIONSHIP BETWEEN GASTRIC UCOSAL BLOOD FLOW AND GASTRIC SECRETORY FUNCTION. Eng.) Ambromovage, A. M. (Hahnemann Hosp. and edical Coll., Philadelphia, PA). pp. 8; 1975 [available through National Technical Information Services, ashington, DC, Document No. AD-A013 267/OWJ].

)084 ENDOGENOUS INHIBITORS OF THE GASTRIC SECRETION. (Eng.) Glass, G. B. J. (New York edical Coll., New York, NY 10029). *Biol. Gastro- nterol. (Paris)* 8(3):245-261; 1975.

)085 SUPPRESSION OF THE STOMACH SECRETION IN DOGS WITH THE BLOOD SERUM IMMUNOGLOBULIN GASTROGLOBIN) OF HEALTHY HUMANS. (Rus.) Polosatov, . V.; Boiko, N. S. (Pavlov Inst. Physiology, USSR cad. Sciences, Leningrad, USSR). *Fiziol. Zh. SSSR* 2(3):466-468; 1976.

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088 NON-GASTRINIC GASTROSECRETAGOGUE FACTOR FROM HOG ANTRAL MUCOSA AND PANCREAS: COM- ARISON WITH HYPOXANTHINE. (Fre.) Vatier, J.; obert, J. C.; Sauvage, M.; Abastado, M.; Bonfils, S. INSERM U-10, Hopital Bichat, 170, boulevard Ney, 75877 Paris, Cedex 18, France). *Biol. Gastro- nterol. (Paris)* 9(1):17-23; 1976.

089 THE EFFECTS OF DRUGS AND SECRETAGOGUES ON THE BIOSYNTHESIS OF THE GLYCOPROTEINS OF HE GASTRIC MUCOSA [Abstract]. (Eng.) Waldron- dward, D.; Robert, L.; Robert, A. M.; Bader, J. P. Dept. Surgery, McGill Univ., Montreal, Canada). *igestion* 13(3):189; 1975.

090 THE EFFECT OF BROCRESINE (NSD-1055) ON BASAL AND STIMULATED GASTRIC ACID SECRE- ION IN CHICKENS. (Eng.) Kramer, B.; Ruoff, H. .; Sewing, K. Fr. (Pharmakologisches Institut der niversitat Tubingen, Wilhelmstr. 56, D-7400 ubingen, W. Germany). *Arzneim. Forsch.* 25(11):1800- 302; 1975.

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0093 GASTRONE, ENDOGENOUS INHIBITOR OF GASTRIC ACID SECRETION: ITS FURTHER PURIFICATION AND BIOASSAY ON RATS WITH CHRONIC GASTRIC FISTULA [Abstract]. (Eng.) Lopes, J. D.; Glass, G. B. J. (New York Medical Coll., New York, NY). *Digestion* 13(3):178-179; 1975.

0094 ACTIVATION OF FUNDIC GASTRIC MUCOSA PROTEIN KINASE (PK) BY HISTAMINE (H) [Abstract]. (Eng.) Wollin, A.; Barnes, L. D.; Hui, Y. S. F.; Dousa, T. P. (Mayo Clinic and Foundation, Rochester, MN). *Clin. Res.* 23(5):484A; 1975.

0095 A MEASUREMENT OF IMMUNOREACTIVE GASTRIN IN CANINE GASTRIC JUICE IN RESPONSE TO HISTAMINE [Abstract]. (Eng.) Lanciault, G.; Adair, L.; Brooks, F. P. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Digestion* 13(3):176; 1975.

0096 IDENTIFICATION AND QUANTIFICATION OF SIDE CHAIN METHYLATED HISTAMINES DURING GASTRIC SECRETION IN DOG. THEIR POSSIBLE PHYSIOLOGICAL IMPORTANCE [Abstract]. (Eng.) Navert, H. (Gastrointestinal Res. Unit, Univ. Sherbrooke, P.Q., Canada). *Digestion* 13(3):183; 1975.

0097 EFFECT OF METIAMIDE ON THE DEVELOPMENT OF DUODENAL ULCERS PRODUCED BY CYSTEAMINE OR PROPIONITRILE IN RATS [Abstract]. (Eng.) Dzau, V. J.; Haith, L. R., Jr.; Szabo, S.; Reynolds, E. S. (Peter Bent Brigham Hosp., Boston, MA). *Clin. Res.* 23(5):576A; 1975.

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0101 A NEW PROSTAGLANDIN METABOLITE OF ARACHIDONIC ACID. FORMATION OF 6-KETO-PGF$_{1\alpha}$ BY THE RAT STOMACH. (Eng.) Pace-Asciak, C. (Hosp. Sick Children, 555 University Ave., Toronto M5G 1X8, Canada). *Experientia* 32(3):291-292; 1976.

0102 EFFECT OF SAS (A NEW 10-N-ACYLAMINOPHENOTHIAZINE) ON GASTRIC SECRETION AND ULCERATION IN RATS. (Eng.) Kumar, A.; Sharma, H. L.; Sharma, V. N. (S.M.S. Medical Coll., Jaipur, India). *Br. J. Pharmacol.* 56(4):491-493; 1976.

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0107 THE DIGESTION OF THE GLYCOPROTEIN FROM PIG GASTRIC MUCUS WITH PEPSIN AND OTHER PROTEOLYTIC ENZYMES. (Eng.) Scawen, M.; Allen, A. (Dept. Biochemistry, Ridley Bldg., Univ. Newcastle Upon Tyne Newcastle Upon Tyne NE1 7RU, U.K.). *Biochem. Soc. Trans.* 3(6):1107-1109; 1975.

0108 THE HISTOCHEMICAL INVESTIGATION OF CARBOANHYDRASE AND HCO$_3$-STIMULATED ATPase IN THE RAT STOMACH DURING HCl SECRETION. (Rus.) Deribas, V. I. (Inst. Cytology and Genetics, Siberian Branch, USSR Acad. Sciences, Novosibirsk, USSR). *Arkh. Anat. Gistol. Embriol.* 70(2):51-54; 1976.

See also, 0071, 0072, 0198, 0200, 0204, 0205, 0207, 0211, 0338, 0357, 0358, 0365, 0374, 0385.

SECRETION AND METABOLISM

Pancreas

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0112 CANINE EXOCRINE PANCREATIC SECRETORY CHANGES INDUCED BY CALCIUM OR ETHANOL PLUS CALCIUM INTRADUODENAL INFUSION. (Eng.) Levesque, D.; Tiscornia, O. M.; Voirol, M.; Bretholz, A.; Laugier, R.; Sarles, H. (INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastro enterol. (Paris)* 8(4):357; 1975.

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CANINE PANCREAS [Abstract]. (Eng.)
omschke, S.; Konturek, S. J.; Domschke, W.; Dem-
inski, A.; Thor, P.; Krol, R.; Demling, L. (Dept.
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CHOLINE-MEDIATED ENZYME SECRETION AND
YCLIC GMP IN THE PANCREAS [Abstract]. (Eng.)
lbano, J.; Harvey, R. F.; Bhoola, K. D. (Medical
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3(1/2):104-105; 1975.

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VASOACTIVE INTESTINAL PEPTIDE (VIP) ON
SOLATED PANCREATIC ACINAR CELLS FROM THE GUINEA
IG. (Eng.) Christophe, J.; Conlon, T.; Gardner,
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utrition, Faculte de Medecine, Universite Libre
e Bruxelles, Brussels, Belgium). *Biol. Gastro-
nterol. (Paris)* 8(4):361; 1975.

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See also, 0045, 0099, 0140, 0207.

SECRETION AND METABOLISM

Hepatobiliary Tract

119 THE ENZYMIC ISOLATION OF ADULT RAT HEPA-
TOCYTES IN A FUNCTIONAL AND VIABLE STATE.
Eng.) Fry, J. R.; Jones, C. A.; Wiebkin, P.;
ellemann, P.; Bridges, J. W. (Dept. Biochemistry,
niv. Surrey, Guildford, Surrey GU2 5XH, England).
nal. Biochem. 71(2):341-350; 1976.

procedure for the enzymic isolation of adult rat
epatocytes in a functional and viable state was
eveloped. Cell suspensions from male Wistar rats
ere prepared by a nonperfusion collagenase/hyaluro-
idase digestion using a sequential removal and
eplacement of Ca^{2+}. An initial Ca^{2+}-removal stage
as incorporated prior to incubation of the liver
lices in Ca^{2+}-containing collagenase/hyaluronidase
olution that enhanced the cell yield and viability
ndex of the resulting cell suspension. All perfu-
ion steps are omitted, which makes the technique
otentially useful with isolated human liver biopsy
aterial. The cell suspensions contained a large
umber of hepatocytes, the majority (>70%) of which
ere viable. The optimal collagenase concentration
or cell isolation was approximately 70 U/ml of
ncubation mixture. A number of liver-specific
unctions were tested for in these cell suspensions.
ne hepatocytes possessed an endogenous glycogenoly-
ic capability, and the rate of glycogenolysis
as stimulated by 3.9 μg/ml glucagon. These hepa-
ocytes are also capable of dealkylating 7-ethoxy-
oumarin, whether or not NADPH is added. The results
now that it is possible to maintain these isolated
epatocytes in a functional state in monolayer
cultures. Preliminary studies have also shown that the method can be applied successfully to hamster, rabbit, ferret, and fetal and adult human liver tissue with a viability of over 90% in each instance.

0120 LIVER CELL CULTURE TOXICITY OF GENERAL ANESTHETICS. (Eng.) Goto, Y.; Dujovne, C. A.; Shoeman, D. W.; Arakawa, K. (Tokyo Medical Coll., Tokyo, Japan). *Toxicol. Appl. Pharmacol.* 36(1):121-130; 1976.

The cytotoxicity of varying concentrations of three anesthetic agents, ethyl ether (E), halothane (H), and methoxyflurane (MF), and of an investigational agent, isoflurane (IF), on Chang cell cultures grown in monolayers was investigated. Loss of intracellular enzymes into the surrounding media was used to quantitate the cytotoxic effects. Drug concentrations in cells and media were monitored during the experiments. Dose- and concentration-related cytotoxic effects were evident for all drugs. Cell cultures were exposed to the anesthetics at doses of 1.0 or 1.5 μl/ml of media, for 5 hr. The greatest leakage of LDH and β-glucuronidase (BG) was found after exposure to MF; progressively decreasing enzyme loss was seen in media of cultures exposed to H and IF. Ether exerted the least cytotoxic effect: there was no leakage of LDH, but that of BG was greater than controls. The differences among all drugs were statistically significant ($p<0.01$). Cells exposed to MF lost over 98% of their LDH and over 50% of their BG into surrounding media. Control cells lost only 20% LDH and 7.5% BG. The comparative *in vitro* effects of the drugs on liver cells seem to correlate with their hepatotoxic potentials in man. The findings suggest that an additional direct, dose-related toxic effect on hepatocellular membranes may play a role in the seemingly hypersensitivity-type of hepatotoxic reactions to halogenated anesthetics.

0121 INFLUENCE OF PHOSPHOLIPIDS ON LIVER DAMAGE. II. CHANGES IN LIPID CONTENT AND SYNTHESIS AFTER LIVER DAMAGE WITH CARBONTETRACHLORIDE [sic] AND OTHER AGENTS.

(Eng.) Bartsch, G. G.; Gerber, G. B. (Div. Medical Chemistry, A. Nattermann GmbH Cologne, W. Germany). *Acta Hepatogastroenterol.* 22(4):228-236; 1975.

The liver lipid content, incorporation of acetate into hepatic lipids, and hepatic DNA synthesis were studied in normal x-irradiated (2 kr of whole-body irradiation) and partially hepatectomized male Wistar rats and male BALB/c$^+$ mice. The animals were first treated with CCl_4 (0.25 ml to rats and 0.05 ml to mice by stomach tube), and an essential phospholipid (EPL) phosphatidylcholine (1 ml of a 10% aqueous suspension in rats and 0.2 ml in mice, i.p. for 7 days prior to CCl_4 treatment), and/or orotic acid (1% of the diet). 6-^{3}H-thymidine (100 µCi) and acetate 1-^{14}C (5 µCi) were injected i.p. 1 hr before sacrifice. EPL treatment caused no marked change in the hepatic lipid composition of the normal rats or mice. CCl_4 poisoning produced an increase in the lipid content that was observable at 6 hr, more marked at 24 hr, and still noticeable after 7 days. The increase was primarily due to an augmentation of neutral lipids, the phospholipid content being unaltered or slightly decreased. Pretreatment with EPL for 7 days prior to CCl_4 administration significantly decreased the effect of the latter on the hepatic lipid content at 24 hr; the effect was less marked at 6 hr. EPL given as a single injection at the time of CCl_4 treatment had a similar, but less marked, effect. In rats treated with EPL for 7 days following CCl_4 administration, the liver lipid levels returned to normal more rapidly than after CCl_4 treatment alone. CCl_4 poisoning elevated the incorporation of acetate-1-^{14}C into the liver phospholipids, triglycerides, cholesterol, and cholesterol esters, but not the incorporation into total lipids. EPL pretreatment slightly increased the incorporation into triglycerides and phosphatidylcholine. Orotic acid increased all liver lipids in the rat, but not in the mouse; EPL treatment was only slightly beneficial in decreasing this effect. During liver regeneration, the total lipids and, in the rats, the phospholipids increased significantly, and the ratio of neutral lipids to phospholipids was greater than normal; EPL had no effect on this increase. The DNA content of the liver was slightly diminished after EPL treatment, and the increased incorporation of thymidine into the liver DNA during regeneration was further increased by EPL. The inhibition of regeneration caused by whole-body x-irradiation was not influenced by EPL. EPL increased the content and synthesis of thymic DNA in x-irradiated rats, but had no effect on the x-ray-induced depression in intestinal DNA synthesis. The results suggest that phospholipids may prevent the formation or induce the degradation of the hypothetical toxic radical formed by homolytic cleavage of the C-Cl bond in CCl_4 poisoning.

0122 HEPATIC LIPID LEVELS IN INTACT AND THYROIDECTOMIZED RATS FOLLOWING ADMINISTRATION OF TETRACYCLINE OR ETHANOL.

(Fre.) Chaibi, A.; Clement-Champougny, J. (Equipe de Recherche du C.N.R.S. No. 188, U.E.R. Nutrition, Universite de Dijon, Faculte des Sciences Mirande, Campus universitaire, 21000 Dijon, France). *Arch. Int. Physiol. Biochim.* 83(3): 535-552; 1975.

The results of thyroidectomy on hepatic lipids in rats after tetracycline or ethanol administration were examined. Three experiments were conducted in both thyroidectomized and intact rats: to determine the effect of tetracycline (TCL) on animals fed a commercial 6% fat and 17% protein diet (I); to determine the effect of a single dose of ethanol on rats receiving 6% or 19% fat feedings (II); and to measure the effect of ingesting ethanol and 19% lipids for 5 months (III). Female Sprague-Dawley rats were used for I and II, male Wistar rats were used for III. Thyroidectomy was performed 3 weeks prior to testing. In I, TCL was given ip in two injections of 160 mg/kg at 16-hr intervals. In II, ethanol (5 g/kg) was given by gavage. In III, 5%, 10%, 15%, and 20% solutions, each separated by 2 weeks, were given instead of water for 5 months. In thyroidectomized rats, there were significant reductions in total lipids (TL), phospholipids (PL), nonphosphorylated lipids (NPL), and total cholesterol (CH). In a gram of fresh liver, the differences between homologous groups, intact or thyroidectomized, were insignificant with the commercial diet. A conspicuous steatosis developed (NPL x 1.6) in thyroidectomized and normal rats on the semisynthetic diet. TCL led to acute steatosis in normal and thyroidectomized rats, with elevated NPL (3x), TL, and CH levels. The ethanol effect varied directly with the fat composition of the diet. Chronic alcoholism elicited diminished TL and NPL levels in intact and thyroidectomized rats. Relative to dietary lipids, alcohol had no effect on intact animals. The CH level was increased in thyroidectomized animals on semisynthetic diets over that in normal rats. Thyroid removal reduced the free fatty acid in plasma in both feeding and fasting animals and the triglyceride levels in feeding, but not fasting, rats. TCL was without effect on the free fatty acids of intact rats.

0123 HEPATOCYTE VACUOLATION AND INCREASED LIVER WEIGHT OCCURRING IN ANOXIC RATS.

(Eng.) Sykes, B. I.; Penny, E.; Purchase, I. F. H. (Central Toxicology Lab., Imperial Chemical Industries Ltd., Alderley Park, Cheshire SK10 4TJ, England). *Toxicol. Appl. Pharmacol.* 36(1):31-39; 1976.

The postmortem conditions under which hepatocyte acuolation and increased liver weight occur in noxic rats were investigated in Alderley Park istar-derived rats. The rats were killed in a -liter jar to which halothane (25 ml) or other nesthetics were added. The length of time the ats remained in the jar varied. Vacuolation ccurred when rats were killed in 10% halothane aporized in an 80% nitrogen/20% oxygen mixture nd left for 3 min before removal of the liver. f the anesthetic was vaporized in a decreasing ercentage of O_2 in N_2, the incidence of vacuolation ncreased. Slight vacuolation occurred in animals illed separated by halothane who were left as ong as 3 min after cessation of breathing before eing bled by cardiac puncture. Volatile anesthetics chloroform, ether, and methoxyflurane) used in closed jar and an i.p. injection of sodium pento- arbital produced hepatocyte vacuolation. Extensive acuolation occurred in rats killed with N_2 who ere left 5 min before removal of the liver. levated liver/body weight ratios were associated ith vacuolation. It is concluded that the hepa- ocyte vacuolation sometimes observed in rats at ecropsy is associated with anoxia, with vacuolation eveloping after death. When breathing ceases, ew vacuoles are seen unless the animals are killed n anoxic conditions. After death, considerable acuolation develops within a few minutes, but if he animal is bled at the time breathing ceases, he vacuoles do not appear.

124 PROTEIN SYNTHESIS IN LIVER INJURY. SOLUBLE FACTORS OF PROTEIN SYNTHESIS IN THE CYTO- OL FROM ISCHEMIC RAT LIVER. (Eng.) Cajone, F.; chiaffonati, L.; Bernelli-Zazzera, A. (Istituto di atologia Generale, Centro di Patologia Cellulare el CNR, Universita degli Studi di Milano, 20133 ilan, Italy). *Lab. Invest.* 34(4):387-393; 1976.

he soluble factors of protein synthesis contained the cell sap from ischemic livers was investigated male Wistar rats. The high-speed supernatant cell sap) was obtained from the supernatant of schemic liver homogenates. This cell sap was less fficient than that from normal liver in supporting rotein synthesis in cell-free systems. Cell saps rom 120-min ischemic livers contained a reduced mount of transfer RNA (tRNA); the transfer of ^{14}C- eucine to the specific tRNA was impaired; and the ncorporation of leucyl-tRNA into protein was educed, although less than the incorporation of he corresponding amino acid. In a typical experiment, ncorporation in the presence of 120-min ischemic I 5 supernatant amounted to 90,500 counts per min cpm)/mg ribosomal RNA (rRNA) compared to 181,400 pm/mg rRNA attained by the normal cell sap. In ddition, the binding of aminoacyl-tRNA to ribosomal ubunits (40S and 60S) and exogenous messengers polyuridylic acid and uridyl-3',-5'-uridyl-3',-5' guanosine) was less efficient with ischemic than ith normal cell sap, indicating a defective activ- ty of elongation factor 1. The total amount, nd possibly the intracellular distribution, of longation factor 2 was also altered in ischemic ivers. These changes, which are the expression f a multifunctional deficit of ischemic cell sap, re, in general, correlated with the duration of ischemia and do not seem to appear around the "point of no return" of the ischemic liver cells.

0125 ONTOGENY OF GLUCOCORTICOID RECEPTORS IN RAT LIVER. (Eng.) Giannopoulos, G. (Dept. Experimental Medicine, McGill Univ., Montreal, Canada). *J. Biol Chem.* 250(15):5847-5851; 1975.

0126 INFLUENCE OF CALCITONIN ON BILE PRODUCTION IN THE RAT. (Fre.) Dangoumau, J.; Bussiere, C.; Noel, M.; Balabaud, C. (Laboratoire de Pharmacologie, Universite de Bordeaux II, 3, place de la Victoire, F 33000 Bordeaux, France). *J. Pharmacol.* 7(1):69-76; 1976.

0127 THE EFFECT OF SEROTONIN ON BILE SECRETION IN DOGS. (Rus.) Bogach, P. G.; Liashchenko, P. S. (Inst. Physiology, Kiev State Univ., Kiev, USSR). *Fiziol. Zh. SSSR* 62(2):283-288; 1976.

0128 THE LIVER AND STEROID HORMONES. THE LIVER AS A REGULATORY ORGAN OF HORMONE METABOLISM. (Ger.) Kley, H. K.; Kruskemper, H. L. (2. Medizinische Klinik, Moorenstrasse 5, D-4000 Dusseldorf 1, W. Germany). *Med. Klin.* 71(19):799-805; 1976.

0129 NEONATAL ANDROGENIC PROGRAMMING OF HEPATIC STEROID METABOLISM IN RATS. (Eng.) Gustafsson, J. A.; Ingelman-Sundberg, M.; Stenberg, A. (Dept. Chemistry, Karolinska Institutet, S-104 01 Stockholm 60, Sweden). *J. Steroid Biochem.* 6(5):643-649; 1975.

0130 BINDING OF VITAMIN B_{12}-RAT TRANSCOBALAMIN II AND FREE VITAMIN B_{12} TO PLASMA MEMBRANES ISOLATED FROM RAT LIVER. (Eng.) Fiedler-Nagy, C.; Rowley, G. R.; Coffey, J. W.; Miller, O. N. (Dept. Biochemistry, Hoffmann-LaRoche Inc., Nutley, NJ 07110). *Br. J. Haematol.* 31(3):311-321; 1975.

0131 THE ROLE OF CHOLECYSTOKININ IN RADIOGRAPHIC OPACIFICATION OF THE GALLBLADDER [Abstract]. (Eng.) Herzog, R. J.; Nelson, J. A. (Univ. California, San Francisco, CA 94143). *Invest. Radiol.* 10(5):430; 1975.

0132 STUDIES ON THE SUBSTRATE SPECIFICITY OF THE FATTY ACID 5-DESATURASE BY USE OF METHYL BRANCHED ISOMERS OF EICOSA-8,11,14-TREINOIC ACID AND THE METABOLISM OF THESE ACIDS IN RAT LIVER. (Eng.) Do, U. H.; Sprecher, H. (Ohio State Univ., Coll. Medicine, 333 West 10th Ave., Columbus, OH 43210). *Arch. Biochem. Biophys.* 171(2):597-603; 1975.

0133 ISOENZYME PATTERNS OF HUMAN LIVER α-L-FUCOSIDASE DURING DEVELOPMENT. (Eng.) Alhadeff, J. A.; Tennant, L.; O'Brien, J. S. (Dept. Neurosciences, Univ. California at San Diego, La Jolla, CA 92037). *Dev. Biol.* 47(2):319-324; 1975.

0134 ULTRASTRUCTURAL LOCATION OF ALBUMIN AND FIBRINOGEN IN PRIMARY CULTURES OF NEW-BORN RAT LIVER TISSUE. (Eng.) Guillouzo, A.; Feldmann, G.; Boisnard, M.; Sapin, C.; Benhamou, J. P. (Hopital Beaujon, 92110 Clichy, France). *Exp. Cell Res.* 96(2):239-246; 1975.

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0136 THE PREPARATION AND ASSESSMENT OF THE PHYSIOLOGICAL COMPETENCE OF ISOLATED CHICKEN HEPATOCYTES [Abstract]. (Eng.) Dickson, A. J.; Langslow, D. R. (Dept. Biochemistry, Univ. Edinburgh, Edinburgh EH8 9AG, Scotland). *Biochem. Soc. Trans.* 3(6):803, 1034-1037; 1975.

0137 TEMPORARY HEPATIC ASSISTANCE. VIII. COMPARISON OF ISOLATED PORCINE LIVER PERFUSION WITH HOMOLOGOUS BLOOD AND HUMAN BLOOD. FUNCTIONAL ASSESSMENT. (Por.) Mies, S.; Larsson, E. J.; Mittelstaedt, W.; Saez-Alquezar, A.; de Medeiros Torres, P.; Ohtsuki, N.; Caetano da Silva, L.; *et al.* (Figado do Hospital das Clinicas da FMUSP, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 81(1):39-46; 1976.

0138 EFFECT OF VITAMIN B_{12} STATUS ON THE OCCURFENCE OF BRANCHER-CHAIN AND ODD-NUMBERED FATTY ACIDS IN THE LIVER LIPIDS OF THE BABOON. (Eng.) Garton, G. A.; Scaife, J. R.; Smith, A.; Siddons, R. C. (Rowett Res. Inst., Bucksburn, Aberdeen, Scotland). *Lipids* 10(12):855-857; 1975.

0139 MORPHOFUNCTIONAL DIFFERENTIATION IN THE LIVER. 2. MODIFICATION OF THE TOTAL REGENERATIVE RESPONSE BY SELECTED RETICULOENDOTHELIAL ACTIVE AGENTS. (Eng.) Agarwal, M. K. (INSERM Unite 36, 17 Rue du Fer-a-Moulin, Paris 75005, France). *Differentiation* 2(9283):29-37; 1974.

0140 THE DEVELOPMENT OF NERVOUS AND TISSUE COMPONENTS OF THE EXCRETORY DUCTS OF THE LIVER, PANCREAS AND THE SPHINCTER OF ODDI IN HUMAN EMBRYOGENESIS. (Rus.) Majboroda, Y. N. (Dept. Human Anatomy, Medical Inst., Stavropol, USSR). *Arkh. Anat. Gistol. Embriol.* 70(2):47-50; 1976.

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0142 THE IN VITRO EFFECTS OF VITAMIN D ON OXIDATIVE PHOSPHORYLATION AND ADENOSINE TRIPHOSPHATASE ACTIVITY BY RAT LIVER MITOCHONDRIA. (Eng.) Chudapongse, P.; Lowchareonkul, S. (Dept. Pharmacology, Mahidol Univ., Rama VI Road, Bangkok 4, Thailand). *Biochem. Pharmacol.* 24(23):2127-2132; 1975.

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0167 SERUM PROTEIN CHANGES UNDER THE CONDITIONS OF LIVER TRANSPLANTATION IN THE DOG. (Ger.) Otto, G.; Grossmann, H. (Chirurgische Klinik, Medizinische Akademie "Carl Gustav Carus," DDR-8019 Dresden, Fetscherstrasse 74, W. Germany). *Z. Exp. Chir.* 9(3):136-140; 1976.

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0170 FRUCTOSE-INDUCED "GLYCOGENESIS". II. HISTOCHEMICAL STUDIES OF GLYCOGEN METABOLISM IN RAT LIVER AFTER FRUCTOSE OVERLOAD AND SIMILAR DIETS. (Ger.) Matthaei, C.; Sasse, D.; Riede, U. N. (Anatomisches Institut, Albertstrasse 17, D-78 Freiburg i. Br., W. Germany). *Beitr. Pathol.* 157(1): 56-75; 1976.

0171 REVERSIBLE HYPERPLASIA AND HYPERTROPHY OF THE MOUSE LIVER INDUCED BY A FUNCTIONAL CHARGE WITH PHENOBARBITAL. (Ger.) Bohm, N.; Moser, B. (Pathologisches Institut, Albertstr. 19, D-7800 Freiburg i. Br., W. Germany). *Beitr. Pathol.* 157(3): 283-300; 1976.

See also, 0038, 0039, 0040, 0044, 0076, 0207, 0225, 0640, 0673.

SECRETION AND METABOLISM

Intestine

0172 LYSOSOMES IN THE EPITHELIUM OF THE INTESTINE. A DEVELOPMENTAL INVESTIGATION. (Ger.) Gossrau, R. (Anatomisches Institut der Universitat Wurzburg, Koellikerstr. 6, 8700 Wurzburg, W. Germany). *Adv. Anat. Embryol. Cell Biol.* 51(5): 1-92; 1975.

The hormonal status, light microscopic, and ultrastructural histochemistry of pre- and postnatal lysosome (LYS) development in rat gut epithelium were explored. Four discrete functional periods were identified. Beginning with gestation day 15 and ending on postnatal day 1, there is a rapid proliferation of simple columnar epithelium without LYS activity. During subsequent epithelial stratification, LYS and its enzymatic components (acid phosphatase, *N*-acetyl-β-glucosaminidase, α-galactosidase, β-glucuronidase, α-mannosidase, acid β-galactosidase, and carboxylesterases) become actively involved in the transformation of the primitive to the resorptive epithelium. The LYS enzymes appear on gestation day 16 on the luminal side of the epithelium, and only later in the deeper layers of the stratification. The regression of stratification is characterized principally by cell death, which leads to cleft formation, and autophagy, which leads to primary villi formation. By gestation day 18, mesenchyme has infiltrated the villi, and the secondary villi are formed, simultaneous with differentiation of the resorptive epithelium. Cell death is not characteristic of the outer epithelial layer where lysosomes are produced by the endoplasmic reticulum. The basal LYS fuses into the first generation of giant LYS, concurrent with their displacement into the apical cytoplasm and secondary villi formation, especially in the distal gut. Acid hydrolase activity continues to increase distally, while proximal activity develops fully only 2 days prenatally. Regional differences are already established in the gut before birth. Digestive function also begins immediately prenatally, although full enterocyte function develops only postnatally. Distally, the villous membrane system enlarges and the LYS enzymes increase for the second time. Proximally, the enterocytes absorb most of the maternal milk fat. Shortly after onset of the second developmental period (postnatal days 1-23), the gut epithelium is fully functional. The lipids pass the cell via Golgi and endoplasmic reticular intervention, although the number and structure of villi relate to the amount of fat absorbed. The villi are interpreted as transient structures enlarging the cell surface. The proximal, but not the distal, enterocytes ingest maternal antibodies by phagosomes. In the distal giant LYS, 13 different hydrolases can be demonstrated, concurrent with microvillous membrane differentiation for protein transport from maternal milk. Eventually, the enterocytes of the luminal surface ingest macromolecules exclusively. It is believed that disaccharides and peptides are preferentially hydrolyzed in the proximal gut. The third, or retrogression, period extends from day 17 to day 23. LYS enzymatic activity and lactase decreases distally and maltase increases proximally. During the fourth period, beginning at 23 days, all proximal enterocytes with coated vesicles and all distal enterocytes containing giant LYS are replaced by adult absorptive epithelium without the organelle system. The period of regional differentiation is probably controlled by carbohydrate ingestion from maternal milk. Early postnatal adrenal immaturity is thought to ensure that the regional enterocyte differentiation is not prematurely destroyed by formation of adult columnar epithelium.

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AND DISACCHARIDES. (Eng.) Broitman, S.
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he effects of various carbohydrates on the intestinal
bsorption of ethanol were studied in Charles River
ats using a small bowel perfusion system. Fructose,
-*O*-methyl-glucose, glucose, galactose, lactose,
ucrose, and maltose were each added at 50 mM con-
entrations to perfusates containing 50 mM ethanol and
% polyethylene glycol. Perfusates were pumped
hrough the small bowel at 1.5 ml/min, and samples
ere collected at 10-min intervals for 1 hr. From a
ontrol value of 2.45 mmol of ethanol absorbed per
our per animal, glucose, sucrose, galactose, and
altose augmented ethanol absorption from 18 to 33%;
lthough values obtained with these sugars were sig-
ificantly different from those of controls (p<
.005). Only the value obtained with maltose was
ignificantly ($p<0.005$) different from that of the
ther three carbohydrates. Only galactose increased
lood ethanol levels above control values. The cor-
elation coefficient 0.94 ($p<0.01$), expressing the
elation of augmentation of ethanol absorption to the
uantity of water absorbed or lost (net water flux)
uring the perfusion of ethanol with various carbo-
ydrates, implied that the ability of the various car-
ohydrates to augment ethanol absorption is related
o the ability of that sugar to promote water ab-
orption. Addition of maltose (2-25 mM) to an ethanol
erfusate augmented ethanol absorption in a direct
roportion to the quantity of glucose absorbed,
ather than to the quantity of maltose hydrolyzed.
he results suggest that augmentation of ethanol ab-
orption by carbohydrates appears to be dependent
pon sugar-active transport.

174 HISTOCHEMICAL STUDIES ON FAT ABSORPTION IN
THE JEJUNAL MUCOSA AFTER TOTAL PANCREATEC-
OMY IN DOG. (Eng.) Yoshizawa, Y.; Mizumoto, R.;
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istological and histochemical changes in the jejunal
ucosa were investigated to clarify the pathogenesis
f the disturbances of digestion and absorption and
he effect of estrogen on absorption after total
ancreatectomy in dogs. The crypts of Lieberkuhn
n the jejunal mucosa were slightly lengthened, but
decrease in the absorptive surface due to villous
trophy was not observed, after total pancreatectomy.
he jejunal epithelium contained little or no Sudan-
ositive material in normal 24-hr-fasted dogs, but
ipid droplets stained with Sudan III were sometimes
ound in the absorptive epithelium, and occasionally
n the central lacteals, in pancreatectomized dogs
reated with insulin alone (0.5-1.0 U/kg). When
stradiol benzoate (1,000 U/kg) was administered
ogether with insulin, lipid droplets were not ob-
erved in the epithelial cells or central lacteals,
s in control dogs. After p.o. administration of
live oil or oleic acid (1.5 ml/kg each), absorbed
ipid droplets were not observed in the jejunal
ucosa of dogs treated with insulin alone after total pancreatectomy. When estrogen was administered together with insulin, numerous lipid droplets appeared in the jejunal mucosa after p.o. administration of oleic acid, although olive oil was not absorbed. ATP, alkaline phosphatase, and succinic dehydrogenase activity decreased markedly in the absorptive epithelium in dogs treated with insulin alone after total pancreatectomy. Activity returned to normal after the addition of estrogen. The results show that there is a definite impairment in fat absorption after total pancreatectomy, which can be attributed to the decreased activity in the epithelium of enzymes such as ATP, alkaline phosphatase, and succinic dehydrogenase. The activity of these enzymes can be restored by estrogen administration, which is then accompanied by an improvement in fatty acid absorption.

0175 A METHOD OF OBTAINING SUITABLE SPECIMENS OF AUTOLYSED SMALL INTESTINAL MUCOSA EPITHELIUM IN RATS. (Eng.) Martins Campos, J. V.; Santos, A. M. O.; De Angelis, R. (Centro de Nutricao-Inst. Ciencias Biomedicas, Universidade de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(1):55-58; 1976.

0176 EFFECTS OF HIGH CARBOHYDRATE, HIGH FAT, OR HIGH PROTEIN DIETS ON GLUCOSE OXIDATION BY ISOLATED INTESTINAL EPITHELIAL CELLS OF THE CHICK. (Eng.) Raheja, K. L.; Tepperman, J.; Tepperman, H. M. (Veterans Admin. Hosp., Syracuse, NY 13210). *J. Nutr.* 105(11):1433-1439; 1975.

0177 THE BEHAVIOUR OF DIFFERENT MARKERS OF THE MUCOSAL EXTRACELLULAR SPACE IN RAT SMALL INTESTINE. (Eng.) Bohmer, R.; Rommel, K. (Dept. Clinical Chemistry, Univ. Ulm, Ulm, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):398-403; 1975.

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0179 STUDIES ON THE EFFECT OF AMMONIA AND DIETARY NITROGEN ON REPLICATIVE PROCESSES IN THE INTESTINAL MUCOSA OF THE CHICK AND THE RAT [Abstract]. (Eng.) Topping, D. C. (Cornell Univ., Ithaca, NY). *Diss. Abstr. Int. B* 36(12, part 1): 6062-6063; 1976.

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0183 STUDIES ON L-ARGINASE OF THE SMALL INTESTINE. II. INTESTINAL ARGINASE IN YOUNG AND ADULT MAMMALS, AND ITS ROLE IN MAINTAINING UREA BODY POOL. (Eng.) Konarska, L.; Tomaszewski, L. (Medical Sch. Warsaw, Inst. Biopharmacy, ul. Banacha 1, 02-097 Warszawa, Poland). *Biochem. Med.* 14(3):263-273; 1975.

0184 EFFECT OF CADMIUM, IN VIVO AND IN VITRO, ON INTESTINAL BRUSH BORDER ALPASE AND ATPASE. (Eng.) Sugawara, N.; Sugawara, C. (Sapporo Medical Coll., S.1., W.17 Sapporo, 060 Japan). *Bull. Environ. Contam. Toxicol.* 14(6):653-656; 1975.

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0188 IN VIVO REPAIR OF RAT INTESTINAL DNA DAMAGE BY ALKYLATING AGENTS. (Eng.) Kanagalingam, K.; Balis, M. E. (Biochemical Res. Lab., Res. Foundation, Children's Hosp., Washington, DC). *Cancer* 36(6):2364-2372; 1975.

0189 CHARACTERISTICS OF RELEASE OF DUODENAL GASTRIN [Abstract]. (Eng.) Wesdorp, R. I. C.; Funovics, J. M.; Hirsch, H.; Fischer, J. E. (Harvard Medical Sch., Boston, MA). *Surg. Forum* 26:383-384; 1975.

0190 ENTEROGLUCAGON: WITH SPECIAL REFERENCE TO CHANGES IN CONCENTRATION IN THE CIRCULATION. (Eng.) Shima, K. (Osaka Univ. Medical Sch., Osaka, Japan). *Jpn. J. Med.* 14(1):26-27; 1975.

0191 GLUCONEOGENESIS IN INTACT JEJUNAL MUCOSAL CELLS FROM GUINEA PIG [Abstract]. (Eng.) Anderson, J. W.; Bridges, S. R. (Veterans Admin. Hosp., Lexington, KY). *Clin. Res.* 24(3):355A; 1976.

0192 DIACYLGLYCEROL BIOSYNTHESIS IN EVERTED SACS OF RAT INTESTINAL MUCOSA. (Eng.) Breckenridge, W. C.; Kuksis, A. (Toronto-McMaster Lipid Res. Clinic, Univ. Toronto, 1 Spadena Crescent, Toronto, Ontario, Canada). *Can. J. Biochem.* 53(11):1170-1183; 1975.

See also, 0018, 0025, 0072, 0200, 0202, 0203, 0211, 0223, 0227, 0781.

GENERAL

0193 SUPERIOR MESENTERIC ARTERY OCCLUSION IN DOGS: A MODEL TO PRODUCE THE SPECTRUM OF INTESTINAL ISCHEMIA. (Eng.) Bonakdarpour, A.; Ming, S.; Lynch, P. R.; Essa, N.; Reichle, F. (Temple Univ. Sch. Medicine, 3401 N. Broad St., Philadelphia, PA 19140). *J. Surg. Res.* 19(4):251-257; 1975.

A surgical model in dogs that can reliably simulate the spectrum of changes seen in intestinal ischemia in man by varying the length and extent of ischemic bowel is presented. Ischemia of a precise segment of bowel was produced in 36 mongrels by ligation and transectio of a branch of the superior mesenteric artery. Bowel ischemia of 15-60 cm was produced in 11 dogs; none died. No gross abnormalities were present in any of the dogs. Bowel ischemia of 65-105 cm was produced i 11 dogs; none died. Three dogs sacrificed 1-2 months after operation showed focal mucosal atrophy and submucosal fibrosis. Bowel ischemia of 110-200 cm was produced in 14 dogs; 7 died within 2 days and 3 died

ithin 6 days. Hemorrhagic necrosis of the mucosa was
ommon in the regions peripheral to areas of total in-
arction. The remaining dog had bowel ischemia of
17 cm and showed multiple linear ulcerations in the
schemic segment, with infarction. It is concluded
hat this easily reproducible model can reliably be
sed to study the various stages of intestinal ische-
ia from mildly decreased perfusion to complete in-
arction of the intestine.

194 EXPERIMENTAL XENOGENIC IMMUNE PANCREA-
TITIS. IMMUNOHISTOLOGICAL, ENZYME HISTO-
HEMICAL AND ULTRASTRUCTURAL STUDIES. (Ger.) Nizze,
. (Institut fur Allgemeine und Spezielle Pathologic
es Bereichs Medizin der Universitat Rostock, Strem-
elstrasse 14, DDR-25 Rostock 1, E. Germany). *Exp.
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orphological and enzymatic alteration in exocrine
ouse pancreas (MP) after challenge by xenogenic
mmune MP antiserum was analyzed. The test groups
ncluded 24 mice challenged with anti-MP rabbit
erum (group A), 12 with normal rabbit serum (group
), 12 with physiological salt solution (group C),
nd 6 untreated mice. Group A-C received 1, 3, 5,
, 17, or 33 injections, i.p., of 0.3 ml serum or
aline, either at 3 hr or 1, 2, 4, 6, 8, or 16 days.
ancreatic sections were also incubated with
nlabeled anti-rabbit globulin goat serum (ARGS) for
nzyme histochemistry. In group A, a chronic
clerotic pancreatitis appeared, with acinar necroses
nd eosinophil and neutrophil infiltration on days
, 3, and 5 and interstitial lymphocyte, histiocyte,
nd plasma cell inflammation on days 9 and 17.
fter incubation with ARGS, the fluorescence was
educed and restricted to the serosa, which by day
5 reached the acinar basal membranes, indicating
abbit globulin. Nonspecific esterase, acid phos-
hatase, and lipase activity was slight to marked
rom day 1 to day 16, peaking on day 4. Succinic
ehydrogenase, cytochrome oxidase, ATPase, and
lkaline phosphatase were either absent or negligible.
ne enzymatic concentration corresponded temporally
o the granulating lymphoreticular pancreatitis
naracteristic of delayed-type allergic response.

195 EXPERIMENTAL FOREIGN SERUM PANCREATITIS.
HISTOLOGICAL AND HISTOCHEMICAL FINDINGS
N THE EXOCRINE PANCREAS OF THE MOUSE FOLLOWING
EPEATED INTRAPERITONEAL INJECTIONS OF SERUM OF
THER SPECIES. (Ger.) Nizze, H. (Institut fur
llgemeine und Spezielle Pathologie, Universitat
ostock, DDR-25 Rostock 1, Strempelstrasse 14,
. Germany). *Zentralbl. Allg. Pathol.* 119(4):294-
02; 1975.

istological and enzymatic modification of mouse
xocrine pancreas by sera from heterologous species
s described. The test sample included challenge
y bovine serum (A), horse serum (B), human serum
C), rabbit serum (D), pooled AB-mouse serum (E),
nd physiologic salt soltion (F). I.p. injections
ere made at 3 hr or twice daily on days 1, 2, 4,
, or 16. Groups A-D showed interstitial edema
nd marked subperitoneal-perivascular granulocytosis
eosinophils, neutrophils) in the first days. After
day 5, and peaking at days 9 and 17, there was lymphocytic, histiocytic, and plasma cell accumulation and maximum activity for acid and alkaline phosphatases and nonspecific esterase. Negligible interstitial fibrosis and slight acinar dystrophy was apparent only in group A, which elicited more prominent responses than the other groups for all histological and histochemical variables. Repeated inoculation is believed to trigger delayed allergic, serum-sickness type responses.

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GASTROINTESTINAL DISEASES

ESOPHAGUS

0292 VALUE OF CRICOPHARYNGEAL MYOTOMY AND OF DISSECTION OF THE SUPERIOR FIBERS OF THE ESOPHAGUS IN PHARYNGEO-ESOPHAGEAL DYSKINESIA. REPORT OF SEVEN CASES. (Fre.) Desaulty, A.: Piquet, J. J.; Vaneecloo, F. M.; Decroix, G. (Centre Hospitalier Regional, service O.R.L., Place Verdun, 59000 Lille, France). *J. Fr. Otorhinolaryngol.* 24(7):527-533; 1975.

Sectioning of the cricopharyngeal muscle by extramucosal myotomy in seven patients with pharyngeo-esophageal dyskinesia and deglutition dysfunction is reported. In three cases, there was a traumatic vascular or degenerative cause of the pharyngeal paralysis. In two other cases, there was progressive secondary stenosis and modification of the cricopharyngeal muscle, in part isolated (myopathy) and in part associated with degenerative nerve termini (achalasia). One patient presented with idiopathic vertebrobasilar insufficiency with syncopal attacks. There was severe persistent dysphagia in these six cases. In the seventh patient, a pharyngeal paresthesia in a dystonic context could not be modified surgically. In cricopharyngeal section, the incision is made at the anterior edge of the sternocleidomastoid muscle, usually on the left. The sternocleidomastoid is retracted, the omohyoid sectioned, and the inferior thyroid artery and vein ligated. The cricopharyngeal is then sectioned posterior to the cricoid insertion. The muscle fibers surrounding the upper part of the esophagus are also sectioned. Endoscopy is required to confirm complete sectioning of all fibers.

0293 COMPLICATIONS OF VAGOTOMY IN THE TREATMENT OF HIATAL HERNIA. (Eng.) Vansant, J. H.; Baker, J. W., Jr. (Eastern Virginia Medical Sch., Norfolk, VA). *Ann. Surg.* 183(6):629-635; 1976.

The morbidity of vagotomy in the treatment of reflux esophagitis was evaluated in a retrospective study of 311 patients treated by the Hill posterior gastropexy technique of hiatal hernia repair. Vagotomy with antireflux operation was performed on 159 patients (51%); vagotomy was not included for 152 patients (49%). The incidence of postoperative symptoms with or without vagotomy was almost equally divided--64 (41%) without vagotomy and 74 (47%) with vagotomy. The major postoperative symptoms occurring in both groups were abdominal cramps and bloating in 116 patients (37%), which usually disappeared in the early postoperative period and were attributed to the anti-reflux procedure and not to vagotomy. Diarrhea occurred in 26 patients (17%) without vagotomy and in 54 (34%) with vagotomy. Nausea and vomiting occurred in only 2 patients (1%) without vagotomy, but in 20 (13%) with vagotomy. Dumping only occurred in 11 patients with vagotomy (7%). Long-term postoperative symptoms, judged on the basis of symptoms of 3-months' duration, occurred in 1% of patients without vagotomy and in 26% of patients with vagotomy. This study reveals that no additional protection against recurrent symptoms of gastroesophageal reflux or radiographic evidence of recurrent hiatal hernia was provided by inclusion of vagotomy. It is concluded that vagotomy is contraindicated in the treatment of gastroesophageal reflux, except in the presence of peptic ulcer disease.

0294 ENDOSCOPIC SIGNS FOR GASTROESOPHAGEAL REFLUX OBJECTIVELY EVALUATED. (Eng.) Johnson, L. F.; DeMeester, T. R.; Haggitt, R. C. (Walter Reed Army Medical Center, Washington, DC 20012). *Gastrointest. Endosc.* 22(3):151-155; 1976.

Esophagoscopic findings were evaluated in 76 patients with competent (24) and incompetent (52) esophagogastric junctions, objectively demonstrated by distal esophageal sphincter (DES) pressure, the standard acid pH reflux test (SART), and 24-hr monitoring 5 cm above the DES for pH 4. Esophagoscopy was performed in all patients, and endoscopic interpretations were recorded before infusion manometry, SART, and 24-hr pH monitoring. The abnormal reflux group had a lower mean DES pressure (12 mm Hg versus 22 mm Hg, $p<0.001$) and more radiographic reflux (52% versus 17%, $p<0.01$) than the normal reflux group. The dista esophageal mucosa appeared to be normal in 46% of the abnormal reflux group, while 12% of the normal reflux group had an endoscopic appearance of esophagitis. These patients were very heavy cigarette smokers (mean age of 37 yr, a 57 mean pack-yr history of smoking). Papillary length in biopsy specimens was comparable in both smokers and nonsmokers in the abnormal reflux group, while smokers in the normal reflux group had longer papillae ($p<0.02$) than nonsmokers. In comparison to the normal reflux group, the abnormal reflux group more often had hiatal hernias (81% versus 21%, $p<0.005$), patulous diaphragmatic hiatus (52% versus 8%, $p<0.005$), and gastric rugal hypertrophy (13% versus 0%, not significant) in the area of the esophagogastric junction. The endoscopic diagnosis of hiatal hernia combined with either endoscopic esophagitis or patulous diaphragmatic hiatus accurately predicted abnormal reflux in over 90% of the patients. Macroscopic esophagitis and histologic esophagitis are of limited usefulness in cigarette smokers for determining the state of esophagogastric junction competency; endoscopic assessment of esophagogastric junction competence is improved by combined diagnoses.

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0314 GASTRIC CHEMODECTOMA: A STUDY OF ONE CASE AND A REVIEW OF THE LITERATURE. (Fre.) Delamarre, J.; Potet, F.; Capron, J. P.; Hoang Ngoc Minh; Lorriaux, A. (Clinique Medicale A, Centre Hospitalier Universitaire, place Victor-Pauchet, F 80030 Amiens Cedex, France). *Arch. Fr. Mal. App. Dig.* 64(4):339-346; 1975.

The case history of chemodectoma in a 49-yr-old man is presented, and the literature is reviewed. The patient had a history of phenylbutazone and indomethacine management of rheumatoid arthritis and presented with gastrointestinal bleeding. Clinical, radiological, and paraclinical tests were negative, but gastroscopy detected a sessile antral mass with normal mucosa. At intervention, a round elastic tumor embedded in the posterior was excised. Histologically, it was located in the submucosa, with moderate muscularis invasion. Part of the mass was lobulated, with foci of hemorrhagic necrosis. The weakly eosinophilic, voluminous cells had assumed an alveolar arrangement, and neural fibers had proliferated. Final diagnosis was that of a local, probably malignant, chemodectoma. The patient has remained tumor-free for 5 yr. Because of the slow development of the tumor and the ineffectiveness of radiotherapy, tumor resection is the method of choice.

0315 THE NONOPERATIVE TREATMENT OF MASSIVE PYLORODUODENAL HEMORRHAGE BY RETRACTED AUTOLOGOUS CLOT EMBOLIZATION. (Eng.) Eisenberg, H.; Steer, M. L. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Surgery* 79(4):414-420; 1976.

The nonoperative treatment of massive pyloroduodenal hemorrhage by retracted autologous clot embolization is described in six patients who had severe associated illnesses and were very poor candidates for surgical treatment. Bleeding was effectively controlled in five patients. The previously bloody nasogastric aspirate cleared, and the patients' vital signs stabilized. Two patients later experienced bleeding from other sources. Although three patients died, none died as a direct result of bleeding. The only complication encountered, multiple small hepatic infarcts, occurred when the embolized clot migrated from the gastroduodenal artery to the hepatic artery. This was a consequence of the bidirectional nature of gastroduodenal arterial flow; migration can be avoided by eliminating retrograde gastroduodenal arterial flow with a balloon prior to injection of the clot. Selective embolization of retracted autologous clot represents a useful alternative to the surgical management of massive pyloroduodenal hemorrhage and should be considered for the treatment of patients whose associated diseases make them poor candidates for surgical treatment.

0316 PERSONAL EXPERIENCE WITH A NEW PREPARATION IN DOUBLE-CONTRAST RADIOLOGICAL EXAMINATION OF THE STOMACH. (Ita.) Traversin, E.; Motta, U. (Ospedale Civile, via S. M. Caffoncello, I-31100 Treviso, Italy). *Radiol. Med. (Torino)* 61(1):21-38; 1975.

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0319 EARLY COMPLICATIONS AND LONG-TERM RESULTS AFTER TOTAL GASTRECTOMY. A CONTRIBUTION TO FINDING A METHOD OF GASTRIC REPLACEMENT BASED ON OUR OWN OBSERVATIONS. (Ger.) Nier, H.; Ulrich, B.; Jacobs, G.; Gunther, E.; Rumpf, P. (Chirurgische Univ.-Klinik, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Langenbecks Arch. Chir.* 340(4):263-272; 1976.

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See also, 0058, 0080, 0084, 0101, 0198, 0237, 0241
0242, 0243, 0244, 0245, 0246, 0247, 0248
0294, 0359, 0380, 0383, 0387, 0391, 0392
0424, 0427, 0535, 0620, 0669, 0775, 0788
0800, 0809, 0814, 0818, 0824.

STOMACH

Peptic Ulcers

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Serum gastrin concentrations were determined befor and after a standardized meal in 28 patients with duodenal ulcer and in 10 normal control subjects t correlate the relation between functioning parieta cell and gastrin cell masses. All ulcer patients and eight controls received an i.m. injection of

entagastrin (6 μg/kg), and the total acid secretion
or maximum acid output) was collected at 20-min
tervals for 1 hr. Thirteen patients with ulceration
ere normosecretors (mean maximum acid output 0.37 ±
01 mmol/hr/kg) and 15 patients were hypersecretors
.69 ± 0.06 mmol/hr/kg). There was no statistically
gnificant difference between the mean values of
e basal serum gastrin levels of the normal subjects,
e normosecreting duodenal ulcer patients, and the
persecreting duodenal ulcer patients, but the low
lue of the hypersecretors is highly suggestive of
real difference (mean values=75.0, 71.0, and
.0 pg/ml, resp.). The mean integrated gastrin
sponse was significantly higher in normosecretors
an in the normal subjects ($p<0.01$) and the hyper-
cretor patients ($p<0.3$). A significant inverse
rrelation exists between the maximal acid output
d the integrated gastrin response in both normal
bjects and hypersecreting duodenal ulcer patients
<0.05). The results demonstrate that the maximal
id output is an accurate index of the gastric
rietal cell mass.

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no, R.; Isenberg, J. I.; Grossman, M. I. (Veterans
min. Wadsworth Hosp. Center, Los Angeles, CA 90073).
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e effect of the H_2-receptor antagonist cimetidine
gastric acid secretion stimulated by the methyl
nthine caffeine was examined in five duodenal
cer patients and in five normal subjects. One hour
ter the administration of cimetidine (300 mg, p.o.),
ffeine (9 mg/kg/hr, i.v.) was given for 2 hr. Gas-
c juice was collected at 15-min intervals during
ffeine infusion. The mean basal gastric acid out-
was significantly greater ($p< 0.05$) in the duo-
al ulcer patients than in the normal subjects.
er administration of a placebo, i.v., caffeine
usion produced a significant increase ($p<0.025$)
gastric acid secretion in both duodenal ulcer pa-
nts and in normal subjects. The mean caffeine-
mulated gastric secretion during the second hr of
usion was 40.6 ± 7.3% of maximal gastric acid
retion in the duodenal ulcer group and 15.2 ± 1.5%
the normal group ($p<0.01$). In both groups, cimet-
ne abolished the response to caffeine. During
feine infusion after cimetidine, the mean acid
retory rates in both the duodenal ulcer and normal
ups were less than basal. The results indicate
t cimetidine inhibits caffeine-stimulated gastric
d secretion in man.

8 SLEEP PATTERNS AND GASTRIC ACID SECRETION IN DUODENAL ULCER DISEASE. (Eng.) Orr, W.
Hall, W. H.; Stahl, M. L.; Durkin, M. G.; Whitsett,
L. (Veterans Admin. Hosp. [183], 921 NE 13th St.,
ahoma City, OK 73104). *Arch. Intern. Med.* 136
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possible relation between gastric acid secretion
sleep stages during non-drug induced sleep was
estigated for five consecutive nights in five
mal patients and in five patients with duodenal
er. All subjects underwent placement of a naso-
gastric tube, continuous collection of gastric juice, and continuous electroencephalographic monitoring of sleep. Gastric juice was collected in 20-min samples by remote suction, and blood samples were drawn every 20 min on the third night via an indwelling venous needle. There was no significant correlations between the sleep variables and the gastric acid secretion measures ($p<0.05$) or between the sleep variables and the serum gastrin levels ($p<0.05$). Acid secretion decreased significantly from hour 1 to hour 2 in controls and in patients with inactive duodenal ulcer disease, while it increased in patients wiht active duodenal ulcer disease ($p< 0.02$). Each subject had at least one night of recording in which continuous gastric secretion was less than 0.1 mEq/20 min-sample. It appears unlikely that the gastric discomfort of duodenal ulcer patients can be attributed to acid hypersecretion triggered by rapid eye movement sleep.

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See also, 0097, 0099, 0102, 0105, 0230, 0231, 0324,
0333, 0352, 0354, 0415, 0809, 0812, 0818.

SMALL INTESTINE

393 OVERWHELMING WATERY DIARRHEA ASSOCIATED WITH A CRYPTOSPORIDIUM IN AN IMMUNOSUPPRESSED PATIENT. (Eng.) Meisel, J. L.; Perera, D. R.; Meligro, C.; Rubin, C. E. (Group Health Hosp., Dept. Medicine, Univ. Washington, Seattle, WA 98195). *Gastroenterology* 70(6):1156-1160; 1976.

report of intestinal cryptosporidiosis in a 39-yr-old man with severe bullous pemphigoid, who developed overwhelming diarrhea after 5 weeks' treatment with 50 mg of cyclophosphamide and 80 mg of prednisolone daily, is presented. Jejunal and ileal biopsies showed severe mucosal injury, and spherical particles, -4 μ in diameter, were scattered along some epithelial surfaces. These particles appeared to be attached to the brush border of the absorptive cells in the tips and sides of some villi and to the epithelial surface of some crypts. Similar organisms were seen in smears of jejunal fluid. Electron microscopic examination of jejunal bodies showed these spherical organisms to be trophozoites, schizonts, microgametocytes, and macrogametocytes typical of the genus *Cryptosporidium*. Diarrhea resolved 2 weeks after discontinuation of cyclophosphamide and coincided with the disappearance of *Cryptosporidia* from the jejunal biopsies. Immunosuppression may have predisposed this patient to cryptosporidial diarrhea. Cryptosporidiosis is another infection that can be diagnosed by small bowel biopsy. It is concluded that when immunosuppressed patients develop severe diarrhea, opportunistic infection with this and other organisms should be considered as the possible cause.

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0412 BILE ACID-MEDIATED ABSORPTION IN THE ILEUM OF A PATIENT WITH CONGENITAL CHLORIDORRHOEA [Abstract]. (Eng.) Rask-Madsen, J.; Kamper, J.; Krag, E. (Glostrup and Gentofte Univ. Hosp., Copenhagen, Denmark). *Gut* 16(10):821; 1975.

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See also, 0059, 0193, 0212, 0237, 0243, 0315, 0322, 0323, 0336, 0343, 0347, 0351, 0448, 0475, 0490, 0521, 0523, 0535, 0562, 0623, 0636, 0669, 0770, 0772, 0774, 0775, 0778, 0779, 0783, 0795, 0796, 0799, 0800, 0809, 0814, 0815, 0818, 0823, 0824, 0826.

SMALL INTESTINE

Malabsorption

0436 PROTEIN-DEPLETION ENTEROPATHY AND RETRACTILE MESENTERITIS. (Fre.) Nouel, O.; Eugene, C.; Gislon, J.; Marche, C. (Service de Gastroenterologie B, Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 64(3):233-238; 1975.

A case history of chylous ascites and exudative enteropathy with retractile mesenteritis is reported. A 62-yr-old man with no medical or surgical history, except 300 ml alcohol/day for 30 yr, presented with edema and ascites, complicating a suspected cirrhosis. The clinical examination was negative. The liver function was normal; the serum proteins were abnormal, but there was no proteinuria; and renal function was normal. The chylous ascites contained 150 lymphocytes/mm^3. Transcutaneous liver biopsy showed portal fibrosis with regenerative nodules. Subsequent confirmation of hypoalbuminemia, hypocalcemia, lymphopenia, hypogammaglobulinemia, and abnormally low serum lipids indicated exudative enteropathy. Jejunal biopsy showed villi of normal structure, but with increased lymphoplasmacytic cellularity, and edema of the lamina propria associated with dilation of the basal intercellular spaces. Exploratory laparotomy found lymph exudation and lymphatic "sacs" of 1- to 2-cm diameter along the mesenteric border of the small bowel and a dense mesentery retracted on itself, measuring 4 cm at the root. All other tissues and spaces, including the mesocolon and retroperitoneum, were normal. A postoperative regimen of medium chain triglycerides was begun. Despite persistent paraclinical signs of enteropathy 10 months postoperatively, the patient's condition is improved. The etiology and absence of recurrences cannot be explained.

0437 CELIAC DISEASE AND ILEUS. (Ger.) Bax, N.; Shmerling, D. H. (Kinderspital Zurich, Universitats-Kinderklinik, Steinwiesstrasse 75, CH-8032 Zurich, Switzerland). *Z. Kinderchir.* 16(1):27-32; 1975.

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us, S-14186 Huddinge, Sweden). *Scand. J. Gastroenter-*
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Abstract]. (Eng.) Douglas, A. P. (Royal Victoria
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and). *Gut* 16(10):825; 1975.

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. (Instituto de Gastroenterologia, calle 25 No. 503,
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975.

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2nd Pediatrics Clinic, Univ. Torino, Torino, Italy).
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0448 ACTIVATION OF TRYPSINOGEN IN THE NORMAL AND COELIAC INTESTINE [Abstract]. (Eng.) Phelan, J. J.; Keane, R.; Fottrell, P. F. (Dept. Biochemistry, Univ. Coll., Galway, Ireland). *Biochem. Soc. Trans.* 3(6):1221-1223; 1975.

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0450 INTESTINAL ABSORPTION OF WATER, ELECTROLYTES AND GLUCOSE IN ADULT CELIAC DISEASE. A STUDY BY THE INTESTINAL PERFUSION TECHNIQUE. (Fre.) Bernier, J. J.; Soule, C.; Galian, A.; Rambaud, J. C.; Modigliani, R.; Matuchansky, C. (Clinique Gastro-Enterologique, Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Arch. Fr. Mal. App. Dig.* 64(6):495-506; 1975.

0451 EXUDATIVE ENTEROPATHY IN THE COURSE OF CELIAC DISEASE. ONE CASE REPORT. (Spa.) Blanco Rabassa, E.; Castaneda Guillot, C.; Fragoso Arbelo, T.; Sagaro Gonzalez, E. (Dept. Pediatrics, Inst. Gastroenterologia 25 No. 503, Havana 4, Cuba). *Rev. Cubana Pediatr.* 47(2):239-245; 1975.

See also, 0370, 0397, 0400, 0770, 0788, 0826, 0827.

LARGE INTESTINE

452 VALUE AND LIMITATIONS OF THE DETERMINATION
OF CARCINOEMBRYONAL ANTIGEN (CEA) IN THE
STOPERATIVE FOLLOW-UP OF PATIENTS WITH CARCINOMA
THE COLON AND RECTUM. (Fre.) Jaeger, Ph.;
ettavel, J.; Wuilleret, B.; Bertholet, M. M.; Mach,
. P. (Institut de biochimie, Universite de Lausanne,
rue du Bugnon, CH-1011 Lausanne, Switzerland).
chweiz. Med. Wochenschr. 105(46):1533-1538; 1975.

ne utility of carcinoembryonic antigen (CEA) levels
evaluating surgical resection for colon carcinoma
nd in postoperative follow-ups is explored. The
linical sample included 101 cases of colorectal carcinoma, 71% of whom had CEA levels equal to or greater than 5 ng/ml. In 45 cases, the CEA levels were consistently below 5 ng/ml 2-4 weeks after resection, while 5 cases presented progressive elevations and were subsequently found to have tumor recurrences. In 19 patients with remote metastases or partial resection, the CEA levels showed a wide scatter, which could not be interpreted prognostically. Follow-ups of 22 of 45 patients with total resection whose preoperative levels were above 2.5 ng/ml, found that 14 had borderline normal or values below 5 ng/ml for up to 27 months postoperatively. Eight showed progressive elevations in CEA for 2-10 months before the tumor recurrence became clinically obvious.

0453 ANO-RECTAL TUBERCULOSIS SIMULATING CARCINOMA. (Eng.) Gupta, A. S.; Sharma, V. P.; Rathi, G. L. (R. N. T. Medical Coll., Udaipur, India). *Am. J. Proctol.* 27(1):33-38; 1976.

Five cases of anorectal tuberculosis, which were all originally diagnosed as rectal cancer, are presented. There were three women and two men, ranging in age between 20 and 45 yr. The first patient presented with rectal pain and bleeding; the second patient with bleeding, pain, and constipation; the third patient with bleeding and constipation; the fourth patient with diarrhea, passage of blood and mucus per rectum, and weight loss; and the fifth patient, with itching and ulceration at the anal verge, anorexia, and weight loss. The symptoms had been present for 6 months to 1.5 yr. The lesions in the first four patients occurred 5-8 cm above the anus; in the fifth patient, the ulcer was perianal and extended into the anal canal. The lesions ranged between 4 x 3 cm and 6 x 4 cm, and were ulcerating in patients two and five. The diagnosis of anorectal tuberculosis was made by biopsy of the lesion in all cases. In one patient, a chest x-ray revealed an old, healed tubercular lesion. The lesions disappeared completely in all patients within 3-6 months of either antituberculin therapy alone or antituberculin therapy combined with temporary pelvic colostomy. In the fifth patient, the lesion was removed, and a Thiersch skin graft was applied. Since these five cases occurred in a group of 75 cases of gastrointestinal tuberculosis, the authors conclude that anorectal tuberculosis may not be as uncommon as the literature indicates.

0454 INNERVATION OF THE APPENDIX IN HIRSCHSPRUNG'S DISEASE INVOLVING ALL OF THE COLON: A HISTOLOGICAL AND HISTOENZYMATIC STUDY. (Fre.) Nezelof, C.; Diebold, N. (Hopital des Enfants Malades, 149, rue de Sevres, F 75730 Paris Cedex 15, France). *Nouv. Presse Med.* 4(40):2859-2861; 1975.

The biopsy role of appendectomy in the total colonic type of Hirschsprung's disease is explained. The logic is based on the fact that autonomic innervation of the pediatric appendix reflects that of the cecum. There is little risk of perforation and littoral injury, which multiple colonic biopsies convey. A histochemical study was performed on 13 appendectomy samples taken during the first postnatal months, including 5 infants with total colon disease, 5 infants with various gastrointestinal disorders, and 3 infants with partial Hirschsprung involvement. Specimens were stained conventionally with hematoxylin-eosin and for nonspecific esterases, which demonstrated both efferent and afferent fibers equally well. Both cecal and appendix specimens were completely aganglionic in cases of total colonic involvement. The cecum and appendix were positive and the colon was entirely negative in cases of partial involvement. All intestinal samples were positive for autonomic neurons in the five patients with assorted gastrointestinal diseases. Appendectomy is recommended when an obstruction in the neonatal or postnatal period makes diagnosis and emergency treatment for the absence of colonic ganglia difficult.

0455 MICROBIAL FLORA OF THE COLON. (Ger.) Bernhardt, H.; Knoke, M. (Medizinische Universitats-Klinik, 22 Greifswald, Friedrich-Loeffler-Str. 23a, W. Germany). *Dtsch. Gesundheitsw.* 31(13):577-582; 1976.

0456 A DEFICIENCY OF DIETARY FIBER MAY BE ONE CAUSE OF CERTAIN COLONIC AND VENOUS DISORDERS. (Eng.) Burkitt, D. P. (Medical Res. Council External Scientific Staff, London, W1, England). *Am. J. Dig. Dis.* 21(2):104-108; 1976.

0457 A CRITIQUE OF "FIBER DEFICIENCY." (Eng.) Mendeloff, A. I. (Johns Hopkins Sch. Medicine, Baltimore, MD). *Am. J. Dig. Dis.* 21(2):109-112; 1976.

0458 DIAGNOSIS OF COLONIC DISEASES USING FIBERCOLONOSCOPE. (Eng.) Watanabe, H.; Imai, H.; Narasaka, T.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Tohoku, Japan). *Asian Med. J.* 18(4):27-30; 1975.

0459 NEW ASPECTS OF THERAPEUTIC COLOSCOPY. (Eng.) Fruhmorgen, P.; Zeus, J.; Demling, L. (Medical Univ.-Klinik, Krankenhausstr. 12, 852 Erlangen, W. Germany). *Endoscopy* 7(2):59-63; 1975.

0460 CARCINOEMBRYONIC ANTIGEN IN COLORECTAL PRACTICE: REPORT OF THREE CASES. (Eng.) Martin, E. W., Jr.; Kibbey, W. E.; Samson, R.; Stewart, W.; Hardy, T.; Minton, J. P. (Ohio State Univ. Coll. Medicine, 410 West Tenth Ave., Columbus, OH 43210). *Dis. Colon Rectum* 19(2):99-106; 1976.

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0463 THE SKIN-LEVEL DECOMPRESSION COLOSTOMY. (Eng.) Freund, H.; Charuzi, I.; Eyal, Z. (Hadassah Univ. Hosp., Jerusalem, Israel). *Am. J. Proctol.* 26(5):37-38; 1975.

0464 USE OF A MECHANICAL SUTURING APPARATUS IN LOW COLORECTAL ANASTOMOSIS. (Eng.) Fain, S. N.; Patin, C. S.; Morgenstern, L. (Cedars-Sinai Medical Center, Los Angeles, CA). *Arch. Surg.* 110(9):1079-1082; 1975.

0465 GLUCONATE ZINC IN ACRODERMATITIS ENTEROPATHICA. (Eng.) Hirsh, F. S.; Michel, B.; Strain, W. H. (Univ. Hosps. Cleveland, 2065 Adelbert Rd., Cleveland, OH 44106). *Arch. Dermatol.* 112(4): 475-478; 1976.

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0467 APPENDICECTOMY. (Eng.) Keddie, N. (Manchester Royal Infirmary, Manchester, England). *Br. J. Hosp. Med.* 14(2):175-188; 1975.

0468 GIANT MUCOCELE OF THE APPENDIX WITH HETEROTOPIC BONE FORMATION: REVIEW OF THE LITERATURE AND CASE REPORT. (Eng.) Govoni, A. F.; Kelly, W. J. (General Hosp., Sault Ste. Marie, Ontario, Canada). *Am. J. Ther. Clin. Rep.* 1(1):31-44; 1975.

0469 COMPARATIVE INTERNATIONAL INCIDENCE AND MORTALITY. (Eng.) Correa, P.; Haenszel, W. *In: Cancer Epidemiology and Prevention. Current Concepts.* Schottenfeld, D., ed. (Springfield: Charles C. Thomas): pp. 386-403; 1975.

0470 NEW HOPE IN BOWEL CANCER. (Eng.) Cooper, R. G. (State Univ. New York Sch. Medicine, Buffalo, NY). *Consultant* 16(2):66-71; 1976.

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0472 PRIMARY SUTURE OF THE PERINEAL WOUND FOLLOWING RECTAL EXCISION FOR ADENOCARCINOMA. (Eng.) Marks, C. G.; Leighton, M.; Ritchie, J. K.; Hawley, P. R. (Radcliffe Infirmary, Oxford, England). *Br. J. Surg.* 63(4):322-326; 1976.

0473 FAMILIAL COLON CANCER. (Eng.) Miller, M. S.; Costanza, M. E.; Li, F. P.; Stolbach, .; Stone, R.; Nathanson, L. (Tufts New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Cancer* 37(2):946-948; 1976.

0474 MORTALITY AND PROGNOSIS OF OBSTRUCTING CARCINOMA OF THE LARGE BOWEL. (Eng.) utton, J. W.; Hreno, A.; Hampson, L. G. (Dept. Surgery, McGill Univ., Montreal, Canada). *Am. J. Surg.* 31(1):36-41; 1976.

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0477 MALIGNANT MELANOMA OF THE ANAL CANAL. (Eng.) Singh, W.; Madaan, T. R. (Medical Coll., Rohtak [Haryana], India). *Am. J. Proctol.* 27(1):49-55; 1976.

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0479 TREATMENT OF LARGE VILLOUS TUMORS OF THE LOWER RECTUM BY MULTIPLE-STAGE FULGURATION. (Eng.) Hanley, P. H. (Ochsner Clinic, 1514 Jefferson Highway, New Orleans, LA 70121). *Texas Med.* 72(1): 98-101; 1976.

0480 CYSTIC LYMPHANGIOMA OF THE CECUM WITH ILEOCECAL INTUSSUSCEPTION: CASE REPORT. (Eng.) Lam, A.; Ternberg, J. L. (Barnes & Wohl Hosp., 4960 Audubon Ave., St. Louis, MO 63110). *Am. Surg.* 41(10):648-649; 1975.

0481 COLITIS CYSTICA PROFUNDA. (Eng.) Tedesco, F. J.; Sumner, H. W.; Kassens, W. D., Jr. (Univ. Miami Sch. Medicine, P.O. Box 875, Biscayne Ann., Miami, FL 33152). *Am. J. Gastroenterol.* 65 (4):339-343; 1976.

0482 CLINDAMYCIN-ASSOCIATED COLITIS: REPORT OF A CASE. (Eng.) Theodoropoulos, G.; Seitanidis, B.; Archimandritis, A.; Bougas, S. (Medical Sch., Univ. Athens, Athens-609, Greece). *Dis. Colon Rectum* 18(5):435-437; 1975.

0483 CLINDAMYCIN-ASSOCIATED PSEUDOMEMBRANOUS COLITIS TREATED WITH PREDNISONE. (Eng.) Causey, J. Q. (Field Clinic, Centreville, MS 39631). *South. Med. J.* 69(3):372-374; 1976.

0484 CLINDAMYCIN-ASSOCIATED PSEUDOMEMBRANOUS COLITIS [Letter to Editor]. (Eng.) Miller, B. R.; Wheeler, M. H. (Univ. Hosp. Wales, Cardiff, Wales). *Br. Med. J.* 3(5980):433-434; 1975.

0485 COLITIS DUE TO LINCOMYCIN. (Fre.) Spay, G.; Remignon, M.; Bugnon, B.; Brette, R.

(18 quai V.-Augagneur, 69003 Lyon, France). *Lyon Chir.* 72(1):74-76; 1976.

0486 MANAGEMENT OF COLITIS CAUSED BY IRRADIATION. (Eng.) Smith, J. S., Jr.; Milford, H. E. (Polyclinic Hosp., Harrisburg, PA). *Surg. Gynecol. Obstet.* 142(4):569-572; 1976.

0487 DISTRIBUTION OF DIVERTICULA OF THE LARGE INTESTINE BASED ON POSTMORTEM STUDIES. (Eng.) Podesta, M. T.; Pace, J. L. (Dept. Anatomy, Royal Univ. Malta, Msida, Malta). *Int. Surg.* 60(8): 395-396; 1975.

0488 ACUTE DIVERTICULITIS OF THE CAECUM. (Eng.) Woo, W. H.; Cheng, F. C. Y. (Kwong Wah Hosp., Hong Kong). *Aust. N.Z. J. Surg.* 45(3):274-276; 1975.

0489 DIVERTICULITIS: SELECTIVE SURGICAL MANAGEMENT. (Eng.) Rugtiv, G. M. (2500 Hospital Drive, Mountain View, CA 94040). *Am. J. Surg.* 130(2):219-225; 1975.

0490 RECTOVAGINAL FISTULA IN PATIENTS WITH COLITIS: REVIEW AND REPORT OF A CASE. (Eng.) Faulconer, H. T.; Muldoon, J. P. (1800 South Limestone St., Lexington, KY 40503). *Dis. Colon Rectum* 18(5):413-415; 1975.

0491 A CLASSIFICATION OF FISTULA-IN-ANO. (Eng.) Parks, A. G.; Gordon, P. H.; Hardcastle, J. D. (St. Mark's Hosp., London, England). *Br. J. Surg.* 63(1):1-12; 1976.

0492 AN UNUSUAL CAUSE OF AN "INTRAMURAL" GAS COLLECTION IN THE RIGHT COLON. (Ger.) Wenz, W.; Stremmel, W. (Abteilung fur Rontgendiagnostik der Universitat Freiburg, D-7800 Freiburg, Hugstetterstr. 55, W. Germany). *Radiologe* 15(11): 442-444; 1975.

0493 OUTPATIENT TREATMENT OF HAEMORRHOIDS BY CRYOTHERAPY. (Eng.) Kaufman, H. D. (Selly Oak Hosp., Birmingham, England). *Br. J. Surg.* 63(6): 462-463; 1976.

0494 HIRSCHSPRUNG'S DISEASE. PROBLEMS IN DIAGNOSIS AND MANAGEMENT. (Eng.) Cywes, S. (Dept. Pediatric Surg., Univ. Cape Town, Cape Town, South Africa). *S. Afr. J. Surg.* 13(4):219-222; 1975.

0495 TOXIC MEGACOLON. (Eng.) Rosenberg, M. (Dept. Medicine, Univ. California, San Francisco, CA 94143). *West. J. Med.* 124(2):122-127; 1976.

0496 CHRONIC INTUSSUSCEPTION IN CHILDREN. (Eng.) Rees, B. I.; Lari, J. (Welsh Natl. Sch. Medicine, Cardiff, Wales). *Br. J. Surg.* 63(1): 33-35; 1976.

0497 INTUSSUSCEPTION OF THE RECTUM—INTERNAL PROCIDENTIA: TREATMENT AND RESULTS IN 90 PATIENTS. (Eng.) Ihre, T.; Seligson, U. (Surgical Dept., Serafimerlasarettet, S-112 83 Stockholm, Sweden). *Dis. Colon Rectum* 18(5):391-396; 1975.

0498 GRIFFITHS' POINT: CRITICAL ANASTOMOSIS AT THE SPLENIC FLEXURE. SIGNIFICANCE IN ISCHEMIA OF THE COLON. (Eng.) Meyers, M. A. (Dept. Radiology, New York Hosp.-Cornell Univ. Medical Center, 525 East 68th St., New York, NY 10021). *Am. J. Roentgenol.* 126(1):77-94; 1976.

0499 SEGMENTAL NARROWING OF THE SIGMOID COLON. (Eng.) Lydon, S. B.; Wu, W.; Dodds, W. J. (Milwaukee County Medical Complex, 8700 West Wisconsin Ave., Milwaukee, WS 53226). *Am. J. Dig. Dis.* 21(1):44-46; 1976.

0500 STERCORACEOUS PERFORATION OF THE CECUM: REPORT OF TWO CASES. (Eng.) Lasser, A.; Conte, M.; Solitare, G. B. (36 Whitney Lane, Orange, CN 06477). *Dis. Colon Rectum* 18(5):410-412; 1975.

0501 STERCORAL PERFORATION OF THE SIGMOID COLON: REPORT OF TWO CASES. (Eng.) Hakami, M.; Mosavy, S. H.; Tadaiion, A. (Isfahan Univ. Sch. Medicine, Isfahan, Iran). *Dis. Colon Rectum* 18(6): 512-513; 1975.

0502 GENERALIZED MULTIFOCAL PERITONITIS, A COMPLICATION OF APPENDECTOMY. (Fre.) Harouchi, A.; Ghnassia, J. C.; Bondeux, D.; Cloup, M.; Pellerin, D. (Hopital des Enfants Malades, 149, rue de Sevres, 75015 Paris, France). *Ann. Chir. Infant.* 17(2):81-92; 1976.

0503 APPENDICEAL POLYPS. (Eng.) Rathmell, T. K. (No affiliation given). *J. Med. Soc. N.J.* 72(9):768-769; 1975.

0504 A NEW APPROACH TO COLONIC POLYPS. (Eng.) Wolff, W. I. (Mount Sinai Sch. Medicine, New York, NY). *Am. Fam. Physician* 12(3):125-132; 1975.

0505 INFANTILE POLYPOSIS. AN INITIAL REPORT OF 30 CASES. (Spa.) Estrada Rodriguez, M.; Cordova Vargas, L.; Alvarez Carrazana, L.; Luis Abello, I. (No affiliation given). *Rev. Cubana Pediatr.* 47(2):265-271; 1975.

506 REMOVAL OF POLYPS OF THE COLON BY LAPARO-
TOMY COMPARED WITH REMOVAL BY COLONOSCOPY.
Eng.) Stein, H.; Kratzer, G. L. (1447 Hamilton St.,
llentown, PA 18102). *Dis. Colon Rectum* 18(5):397-
98; 1975.

507 INTRAOPERATIVE FIBEROPTIC COLONOSCOPY—"THE
DIFFICULT POLYPECTOMY." (Eng.) Wilson, S.
; Poisson, J.; Gamache, A.; Anderson, M. J., Jr.;
Mine, W. H. (Mayo Clinic, 200 First St. SW, Roches-
er, MN 55901). *Dis. Colon Rectum* 19(2):136-138;
76.

0508 TRANSVERSE COLON VOLVULUS IN PEDIATRIC PATIENTS. (Eng.) Howell, H. S.; Freeark, R. J.; Bartizal, J. F. (Loyola Univ. Stritch Sch. Medicine, Maywood, IL). *Arch. Surg.* 111(1):90; 1976.

See also, 0193, 0221, 0222, 0240, 0250, 0252, 0254, 0255, 0277, 0322, 0326, 0398, 0401, 0408, 0421, 0423, 0434, 0435, 0516, 0519, 0770, 0772, 0778, 0779, 0781, 0783, 0795, 0796, 0819, 0850.

LARGE INTESTINE

Ulcerative Colitis

09 PLASMA PREDNISOLONE LEVELS AFTER ADMINI-
STRATION OF PREDNISOLONE-21-PHOSPHATE AS A
TENTION ENEMA IN COLITIS. (Eng.) Powell-Tuck, J.;
nnard-Jones, J. E.; May, C. S.; Wilson, C. G.;
terson, J. W. (St. Mark's Hosp., London EC1, Eng-
nd). *Br. Med. J.* 1(1):193-195; 1976.

competitive protein binding assay was used to mea-
re plasma prednisolone levels in seven patients
th colitis after the administration of 20 mg
ednisolone-21-phosphate, p.o., or as a retention
ema. Prednisolone appeared in the plasma of all
tients after the enema, and concentrations rose to
peak within 3 hr. In two cases, the enema was
tained for only 0.6 and 1.6 hr, resp., and the peak
nded to occur earlier and the levels fell after
acuation. There was no obvious correlation with the
tivity of the disease or the distance traveled by
e enema in the other patients. The comparisons
tween the plasma prednisolone levels after p.o. and
ctal administration for the four patients who re-
ined the enema show that in two patients, the levels
re higher after p.o. administration, in one, the
vel was higher after the enema, and in one, the
vels were similar. These results suggest that the
ministration of prednisolone by retention enema may
ert a systemic, as well as local, effect.

10 PERICARDITIS ASSOCIATED WITH ULCERATIVE
COLITIS AND CROHN'S DISEASE. (Eng.)
dman, M. J.; Moir, D. J.; Holt, J. M.; Truelove,
C. (Dept. Medicine, Univ. Chicago, Chicago, IL).
J. Dig. Dis. 21(2):98-102; 1976.

cases (a 50-yr-old woman and a 31-yr-old man) of
flammatory bowel disease with cardiac complications
reported. The woman had had a rectovaginal
stula excised and subsequently developed symptoms
ggestive of Crohn's disease of the colon. She was
treated by a temporary relieving ileostomy with a separate distal stoma, through which infusions of hydrocortisone hemisuccinate solution were given. Almost 2 yr later the ileostomy was taken down and the continuity of the intestine restored. Seventeen days later, pericarditis was noted. Prednisolone (40 mg/day) brought about a remarkable improvement, with disappearance of the pericardial friction rub, clearing of the pleural effusion, and remittance of the chest pain. In the second patient, acute pericarditis appeared simultaneously with the initial presentation of ulcerative colitis. The patient responded to treatment with prednisolone (30 mg/day), azulfidine, and prednisolone-21-phosphate retention enemas. The findings in these two cases, taken in conjunction with four other cases reported in the literature, indicate that pericarditis, sometimes accompanied by a pleural effusion, must be considered as one of the systemic complications of inflammatory bowel disease.

0511 ULCERATIVE COLITIS IN BANGLADESH. (Eng.) Alam, M. N.; Islam, N.; Shamsuddin, M. (Inst. Postgraduate Medicine Res., Dacca, Bangladesh). *Bangladesh Med. Res. Counc. Bull.* 1(2):103-109; 1975.

0512 POLYCENTRIC INVESTIGATION ON IDIOPATHIC ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE COLON. (Ita.) Ferrari, A.; Rossini, F. P. (Divisione di Gastroenterologia, Ospedale Maggiore di S. Giovanni Battista e della Citta, Turin, Italy). *Minerva Med.* 67(8):506-511; 1976.

0513 HISTOCHEMICAL CHARACTERISTICS OF THE HEPARIN-ALBUMINOUS COMPLEX OF MAST CELLS AND THE STATE OF THE COAGULATING BLOOD SYSTEM IN THE FOCUS OF PRIMARY LESIONS IN NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Shubich, M. G.; Lopunova, Zh. K.;

Karbovnitskaia, L. P.; Litvinenko, M. D. (Dept. Histology, Krasnaia Armiia Kuban Medical Inst., Krasnodar, USSR). *Arkh. Patol.* 38(2):60-65; 1976.

0514 DISORDERED COLONIC MYOELECTRIC ACTIVITY AS A BASIS FOR ABNORMAL COLONIC MOTILITY IN SYMPTOMATIC ULCERATIVE COLITIS [Abstract]. (Eng.) Matarazzo, S. A.; Snape, W. J., Jr.; Carlson, G. M.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 24(3):288A; 1976.

0515 NEW TREATMENT FOR ULCERATIVE COLITIS? (Eng.) Anonymous (No affiliation given). *Br. Med. J.* 1(6000):2; 1976.

0516 IDENTICAL TWINS DISCORDANT FOR ULCERATIVE COLITIS WITH COLON CANCER. (Eng.) Bisordi, W.; Lightdale, C. J. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY). *Am. J. Dig. Dis.* 21(1):71-73; 1976.

0517 TOXIC MEGACOLON OF ULCERATIVE COLITIS IN INFANCY. (Eng.) Karjoo, M.; McCarthy, B. (Div. Pediatric Gastroenterology, State Univ. New York, Upstate Medical Center, Syracuse, NY). *Pediatrics* 57(6):962-966; 1976.

0518 LOCALIZED GIANT PSEUDOPOLYPOSIS IN ULCERATIVE COLITIS. (Eng.) Keating, J. W., Jr. Mindell, H. J. (Univ. Vermont Coll. Medicine, Burlington, VT 05401). *Am. J. Roentgenol. Radium Ther Nucl. Med.* 126(6):1178-1180; 1976.

0519 ACUTE COLITIS RESEMBLING ULCERATIVE COLITI IN THE HEMOLYTIC-UREMIC SYNDROME. (Eng.) Craner, G. E.; Burdick, G. E. (Letterman Army Medica Center, Presidio, San Francisco, CA 94129). *Am. J. Dig. Dis.* 21(1):74-76; 1976.

See also, 0844, 0852.

PANCREAS

0520 CYSTADENOMA OF THE PANCREAS. TWO NEW CASES: ONE TREATED BY LEFT PANCREATECTOMY, THE OTHER BY DUODENOPANCREATECTOMY OF THE HEAD OF THE PANCREAS. (Fre.) Adloff, M.; Arnaud, J. P. (No affiliation given). *Chirurgie* 101(5):303-310; 1975.

The case histories of two patients with pancreatic cystadenoma are presented. A 51-yr-old woman, presenting with significant anemia, anorexia, vomiting, and epigastric sensitivity had been cholecystectomized 10 yr earlier; shortly thereafter, a pancreatic pseudocyst was discovered at laparotomy for hypochondrial discomfort. A pancreatic lesion due to splenic vein displacement was suspected on arteriography; a laparotomy was performed. A highly vascular intragastric mass contiguous to the tail of the pancreas was found. Gastrotomy confirmed that the posterior gastric wall was elevated by a tumor 8 cm in diameter. A caudal pancreatectomy with segmental gastric resection and a splenectomy were performed. A cystadenoma with multiple cystic cavities, which had been interpreted 10 yr earlier as a pseudocyst and managed by cystogastrostomy, was confirmed. A 46-yr-old woman with an unremarkable history presented with a mass in the right hypochondrium. A tumor occupying the head of the pancreas and compressing the stomach was found, and a duodenopancreatectomy was performed. Tumor histology showed multiple cysts separated by a plethora of calcified hyaline tissue.

0521 ABOLISHMENT OF ORAL TRYPSIN INHIBITOR STIMULATION OF THE RAT EXOCRINE PANCREAS AFTER DUODENO-JEJUNAL RESECTION. (Eng.) Ihse, I. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 11(1):11-15; 1976.

0522 PNEUMOPANCREATOGRAM ASSOCIATED WITH GAS IN THE BILIARY TRACT. (Eng.) Schwartz, D. N. (East Orange Veterans Admin. Hosp., 3-26 27th St., Fair Lawn, NJ 07410). *Am. J. Gastroenterol.* 65(3):262-263; 1976.

0523 ANOMALOUS BILIARY AND PANCREATIC DUCT INSERTION INTO DUODENAL DIVERTICULA. (Eng.) Nelson, J. A.; Burhenne, H. J. (Veterans Admin. Hosp., Salt Lake City, UT). *Radiology* 120(1):49-52; 1976.

0524 CARCINOMA OF THE PANCREAS. (Eng.) Andersson, A.; Bergdahl, L. (Dept. Surgery, Univ. Umea, Umea, Sweden). *Am. Surg.* 42(3):173-177; 1976.

525 PANCREATIC TUMOR OF MESENCHYMAL ORIGIN
PRESENTING AS OBSTRUCTIVE JAUNDICE. (Eng.)
argules, R. M.; Allen, R. E.; Dunphy, J. E. (Univ.
alifornia Sch. Medicine, San Francisco, CA 94143).
m. J. Surg. 131(3):357-359; 1976.

See also, 0111, 0248, 0279, 0281, 0282, 0283, 0284, 0285, 0286, 0287, 0288, 0527, 0531, 0564, 0636, 0775.

PANCREAS

Pancreatitis

526 ANTIBIOTIC THERAPY IN ACUTE PANCREATITIS.
(Eng.) Cameron, J. L.; Howes, R.; Zuidema,
. D. (Johns Hopkins Medical Inst., Baltimore,
) 21205). *Surg. Clin. North Am.* 55(6):1319-1324;
975.

prospective randomized study was carried out in
5 patients to analyze the efficacy of prophylactic
ntibiotic therapy in acute pancreatitis. Forty-
ight patients received ampicillin (1 g, every 6
r), which was initially administered parenterally
nd later p.o. The antibiotic was given for 5 days
nless a septic complication developed. The other
7 patients were given no prophylactic antibiotics.
l patients received i.v. support, nasogastric
uction, pain medication, and i.m. atropine. In
ne patients receiving antibiotics, the pancrea-
itis was caused by ethanol ingestion in 45 and by
iliary disease in 2; among those not receiving
uch therapy, the corresponding figures were 41
nd 3, resp. There were no deaths in the series.
mong those receiving antibiotics, the average
ength of hospitalization was 9 days; in the other
roup, the average length was 12 days. This dif-
erence was not statistically significant. Serum
mylase values remained elevated for an average
f 2 days in both groups. Of the 95 patients,
1 developed septic complications. Of the five
atients who developed sepsis in the group treated
ith antibiotics, three developed pneumonia and
wo developed a pancreatic abscess. In two of
hese five patients, the organisms were resistant
ampicillin, and in the other three patients no
rganism could be cultured. Of the six patients
th complications in the group that received no
tibiotics, four had pneumonia, one had bacteremia,
d one had a pancreatic abscess. In five of these
x patients, the organism was ampicillin-sensitive.
here was one allergic reaction. Prophylactic anti-
otic therapy in acute pancreatitis does not prevent
scess formation and may make it more difficult
treat due to resistant organisms. It is recom-
ended that prophylactic antibiotic therapy should
t be used in acute pancreatitis.

27 SERUM BETA-GLUCURONIDASE ACTIVITY IN PA-
TIENTS WITH PANCREAS DISEASES. (Pol.)
ugosz, J.; Gabryelewicz, A. (Klinika Gastroentero-
gii Instytutu Chorob Wewnetrznych AM, ul. M.
rie-Sklodowskiej 24a, Bialystok, Poland). *Przegl.
k.* 33(2):315-319; 1976.

0528 THE VALUE OF WATERMAN'S DRAINAGE IN ACUTE PANCREATITIS. (Pol.) Renkielski, K.; Braslawska, J.; Dybicki, M. (I Kliniki Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Debinki 7, 80-221 Gdansk-Wrzeszcz, Poland). *Pol. Przegl. Chir.* 48(2):145-148; 1976.

0529 EFFECT OF AN ELEMENTAL DIET ON PANCREATIC SECRETION IN PANCREATITIS [Abstract]. (Eng.) Keith, R. G.; Smith, R. (St. George's Hosp., London, England). *Biol. Gastroenterol. (Paris)* 9(1): 57; 1976.

0530 THE POSSIBLE ROLE OF SERUM COMPLEMENT SYSTEM IN THE FORMAL PATHOGENESIS OF ACUTE PANCREATITIS: I. IMMUNOPATHOGENETIC PANCREATITIS—LOCAL SCHWARTZMAN-SANARELLI PHENOMENON—ENDOTOXIN INDUCED PANCREATITIS. (Eng.) Seelig, R.; Seelig, H. P. (Inst. Immunology, Univ. Heidelberg, Heidelberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(4):263-268; 1975.

0531 STUDIES OF EXOCRINE PANCREAS FUNCTION IN PATIENTS FOLLOWING ACUTE PANCREATITIS. (Pol.) Stasiewicz, J.; Raimer, M.; Olszewski, S.; Orlowski, K. (Kliniki Gastroenterologii, Instytut Chorob Wewnetrznych AM, ul. M. Curie-Sklodowskiej 24a, 15-276 Bialystok, Poland). *Przegl. Lek.* 33(2): 331-334; 1976.

0532 FIBRINOLYTIC ACTIVITY OF BLOOD IN ACUTE PANCREATITIS. (Pol.) Zajaczkowski, T.; Abucewicz, A.; Szyszka, K.; Wojewska-Zajaczkowska, E. (Kliniki Urologicznej Instytutu Chirurgii PAM, Al. Powstancow 72, 70-111 Szczecin, Poland). *Pol. Przegl. Chir.* 48(2):133-138; 1976.

0533 HEMOSTATIC DISTURBANCES IN ACUTE PANCREATITIS. (Pol.) Gabryelewicz, A.; Prokopowicz, J. (Kliniki Gastroenterologii Instytutu Wewnetrznych AM, ul. M. Curie-Sklodowskiej 24a, Bialystok, Poland). *Przegl. Lek.* 33(2):303-306; 1976.

0534 THE COURSE AND COMPLICATIONS OF ACUTE PANCREATITIS AS OBSERVED IN SURGICAL CLINIC. (Pol.) Zalewski, J.; Klepacki, A.; Szelag, E.

(Kliniki Chirurgii Gastroenterologicznej Instytutu Chirurgii AM, ul. M. Curie-Sklodowskiej 24a, 15-276 Bialystok, Poland). *Przegl. Lek.* 33(2):343-345; 1976.

0535 ACUTE POSTOPERATIVE PANCREATITIS IN PATIENTS OF THE CLINIC OF GENERAL SURGERY, LODZ ACADEMY OF MEDICINE. (Pol.) Wasiak, J.; Szklanny, J.; Modzelewski, B. (Kliniki Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Przemyslowa 18/24 m. 54, 91-704 Lodz, Poland). *Przegl. Lek.* 33(2):339-343; 1976.

0536 ACUTE POSTOPERATIVE PANCREATITIS: REPORT OF 10 CASES. (Fre.) Montariol, T.; Nardi, C. (Hopital Bichat, 170, boulevard Ney, 75018 Paris, France). *Ann. Chir.* 30(3):203-205; 1976.

0537 CALCIFYING ALCOHOLIC PANCREATITIS: REPORT OF A CASE WITH FATAL OUTCOME. (Ger.) Walzel, C. (Chirurgische Abteilung, Krankenhaus der Barmherzigen Bruder, Grosse Mohrengasse 9, A-1020 Vienna, Austria). *Wien. Klin. Wochenschr.* 88(6):212-215; 1976.

0538 PREOPERATIVE STUDIES IN SURGERY FOR CHRONIC PANCREATITIS. (Fre.) Warter, P.; Forster, E.; Cinqualbre, J.; Tongio, J.; Barth, M. (Pavillon chirurgical A, CHU, F 67000 Strasbourg, France). *J. Radiol. Electrol.* 56(3):245-252; 1975.

0539 CHRONIC PANCREATITIS: A CAUSE OF CHOLESTASIS [Abstract]. (Eng.) Scott, J.; Summerfield, J.; Elias, E.; Dick, R.; Sherlock, S. (Royal Free Hosp., London NW3, England). *Gut* 17(5): 385-386; 1976.

0540 VASCULAR COMPLICATIONS OF CHRONIC PANCREATITIS. (Fre.) Cinqualbre, J.; Lautel, J.; Le Maguet, A.; Lafforgue, D.; Forster, E. (Chaire de Clinique chirurgicale, CHU, 67005 Strasbourg Cedex, France). *Ann. Chir.* 30(2):107-115; 1976.

0541 RECURRENT PANCREATITIS AND JAUNDICE: REPORT OF A CASE IN AN ELEVEN-YEAR-OLD GIRL. (Eng.) Alvear, D. T.; Petro, J. (Harrisburg Hosp., Harrisburg, PA 17110). *Am. Surg.* 42(5):358-360; 1976.

See also, 0194, 0195, 0289, 0290, 0291, 0678.

LIVER AND BILIARY TRACT

0542 A CRITICAL EXAMINATION OF THE VALUE OF COMBINED DETERMINATIONS OF LECITHIN:CHOLESTEROL ACYLTRANSFERASE AND LIPOPROTEIN-X IN THE DIFFERENTIAL DIAGNOSIS OF LIVER DISEASE. (Eng.) Miller, J. P.; Johnson, K. (Dept. Medicine, Univ. Hosp. South Manchester, Withington Hosp., Manchester, M20 8LR, England). *Clin. Chim. Acta* 69(1):81-84; 1976.

The value of combined determinations of lecithin: cholesterol acyltransferase (LCAT) and lipoprotein-X (LPX) in the differential diagnosis of liver disease was investigated in 51 patients. Blood taken from the patients was divided into two portions. One was anticoagulated with EDTA (2 mg/ml) and the plasma was used for LCAT estimation; the other was allowed to clot and the serum was used for detection of LPX and measurement of serum cholesterol concentration. LPX was detected in the serum of 25 patients. The diagnosis of 21 patients (data not included on 4 patients) included 10 with extrahepatic obstruction (carcinoma of pancreas, 4; cholangiocarcinoma, 2; stone in common bile duct, 2; bile duct stricture, 1; pancreatitis, 1) and 11 with intrahepatic cholestasis (chronic active hepatitis, 4; other cirrhosis, 3; viral hepatitis, 3; halothane hepatitis, 1). Plasma LCAT estimation in these LPX-positive patients was not useful in differentiating between those who had intrahepatic cholestasis and those who had extrahepatic biliary obstruction. Plasma from normal subjects assayed against a standard substrate gave esterification rates in excess of 20 nmol/ml/hr. It is concluded that the range of plasma LCAT activity is similar in patients with intrahepatic cholestasis and extrahepatic obstruction and does not enable distinction to be made between them.

0543 THE ROLE OF HEREDITY IN CERTAIN CHRONIC LIVER DISEASES IN THE ADULT. (Fre.) Bourel, M.; Simon, M.; Le Marec, B.; Brissot, P.; Alexandre, J. L. (Bloc Hopital Villejean-Pontchaillou, 35011 Rennes, France). *Bordeaux Med.* 8(7):743-757; 1975.

A review of various genetically transmitted adult liver diseases is presented. Wilson's disease, a copper storage disease, is an autosomal recessive defect characterized by hepatolenticular degeneration and elevated transaminases. Transmission of hemochromatosis remains controversial; the literature supports evidence for both autosomal dominant and recessive transmission. There are difficulties with both views, so that the argument for autosomal dominance must also admit variable penetrance, and the argument for autosomal recessive must admit intermediate heredity. Among the constitutional hyperbilirubinemias, the nonconjugated Crigler-Najjar form is thought to be autosomal recessive, and the Gilbert type is thought to be autosomal dominant with variable penetrance. The conjugated form was construed as autosomal dominant up to 1970 when additional evidence supported it as autosomal recessive, which is now the dominant view. Among the sphingolipidoses, Landing's disease, Gaucher's disease, and Niemann-Pick's disease are indisputably autosomal recessive.

0544 NOTES ON HISTOENZYMOLOGY IN HEPATOLOGY (EXCLUSIVE OF CANCER). (Fre.) Traissac, F. J.; Paccalin, J.; Alberti, E. M. (No affiliation given). *Bordeaux Med.* 8(10):1199-1210; 1975.

A review of histochemical methods is presented, and the role of enzyme histochemistry in the diagnosis of glycogenoses, hepatitis, obstructive cholestases, cirrhoses, and intoxication is examined. Of the six types of glycogenoses, four involve the liver, and two are accessible to histochemical assay: von Gierke's and Hers' diseases. In viral hepatitis, alkaline phosphatase is elevated; ATP is reduced in the ducts and increased in the Kupffer cells, sinusoids, and periportal spaces; and 5-nucleotidase is decreased in the ducts. The enzymes more specific to hepatic cells, such as transaminases, are usually reduced, but there is no histoenzymological profile specific to hepatitis. In acute hepatitis, the enzymatic pattern is just as variable, but more marked. Only acid and alkaline phosphatases are found in necrotic areas. The variations in cholestatic hepatitis resemble those for the acute form, except that the levels of glucose-6-phosphatase and the pentose pathway enzymes are lower. Obstructive cholestases present the same type of picture, with most of the enzymes diminished, except for alkaline phosphatase. The lysosomal enzymes are elevated in active cirrhosis. In primary cirrhosis, the pattern varies according to case; in general, either a pattern similar to extrahepatic cholestasis, with retention of certain activities, or one resembling intrahepatic cholestasis is found. Patients with the extrahepatic form tend to have longer survivals.

0545 HAEMOLYSIS IN LIVER DISEASE: RELATIONSHIP TO ERYTHROCYTE MEMBRANE FUNCTION, SERUM BILIRUBIN CONCENTRATION AND PLASMA ELECTROLYTE DISTURBANCES. (Eng.) Powell, L. W.; Halliday, J. W.; Cooksley, W. G. E. (Royal Brisbane Hosp., Brisbane, Queensland 4029, Australia). *Aust. N.Z. J. Med.* 6(1):3-6; 1976.

A study was made to determine whether the hemolysis observed in patients with liver disease is related to dysfunction of the RBC membrane resulting from abnormalities in plasma electrolyte, urea, or bilirubin concentrations. The study group was composed of 45 patients, of whom 4 had acute viral hepatitis; 4, acute alcoholic hepatitis; 24, hepatic cirrhosis; 5, jaundice due to extrahepatic obstruction; 2, acute intravascular hemolysis associated with liver disease; and 6, miscellaneous diseases associated with plasma electrolyte disturbances. RBC membrane permeability was measured by the rate of ^{22}Na influx. In the six patients with abnormalities in plasma electrolyte concentrations, the Na influx was significantly increased. In these patients the abnormal membrane permeability probably reflected a more generalized cell membrane abnormality. However, plasma electrolyte concentration and RBC membrane permeability were normal in the majority of patients with liver disease, all of whom had a reduced RBC survival, and neither electrolyte concentration nor RBC membrane permeability correlated significantly with the half-life (T_{50}) for ^{51}Cr-labeled RBC. Only three patients with liver disease showed a marked increase in ^{22}Na influx. They did not all have severe hemolysis, but spherocytosis was present in each. It is concluded that the Na^+ leak in the RBC of patients with hereditary spherocytosis is not related etiologically to hemolysis. This study does not support a pathogenic role of increased membrane permeability in the premature destruction of RBC in liver disease. The correlation between the T_{50} for ^{51}Cr-RBC and serum bilirubin levels indicates that hemolysis in patients with liver disease is related to the severity of the hepatic disorder, rather than to a direct effect of bilirubin on RBC.

0546 DIFFICULTIES IN THE ETIOLOGICAL DIAGNOSIS OF CHOLESTASES. (Fre.) Traissac, F. J.; Borg, R.; Blanc, A.; Ragnaud, J. M.; Weber, F. (No affiliation given). *Bordeaux Med.* 8(9):1067-1084; 1975.

A compendium summarizes various aspects of cholestasis for differential diagnostic purposes. The physiopathology, clinical picture, biology, scintigraphy, laparoscopy, tomoechography, radiology, and pathological anatomy are topically reviewed. The preclinical values are most often inadequate in defining the cause or even the level of involvement. Scintigraphy cannot be used. Peritoneoscopy provides valuable data, but is not always diagnostic. Among the current radiological procedures, only gastroduodenal transit, which reveals indirect signs of tumor, plays a role. Retrograde catheterization of the ductal system under duodenoscopic control is used for opacification of the common duct or duct of Wirsung. Retroperitoneal transparietohepatic cholangiography is the method of choice, since exploratory laparotomy must be avoided, for differentiating intra- and extrahepatic localization.

0547 HEPATIC INFARCTION: A CLINICOPATHOLOGIC STUDY OF SEVEN CASES. (Eng.) Chen, V.; Hamilton, J.; Qizilbash, A. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario, Canada L8V 1C3). *Arch. Pathol. Lab. Med.* 100(1):32-36; 1976.

The clinical, laboratory, autopsy, and microscopic findings from seven cases of hepatic infarction are presented, and the causes are also reviewed. Hepatic infarction was defined as ischemic necrosis affecting more than one hepatic lobule. All patients had epigastric or right upper quadrant pain, and jaundice and fever were present in six cases. The liver was palpable in only three patients (weight of liver found between 1,350 g and 2,800 g at autopsy). Two patients had infarcts that were of less than 24-hr duration. The sinusoids were filled with blood, corresponding to the hemorrhagic appearance seen grossly. The infarcts consisted of parenchymal coagulative necrosis with partial sparing of the portal tracts and central veins. The liver cells appeared necrotic. In two cases, the infarcts were 24-48 hr old. In these, the central zones showed necrosis of all structures, including portal tracts and central veins. The sinusoids appeared empty. Surrounding the necrotic zone was a variable area of partial necrosis showing congestion. In this area, viable liver cells surrounded the portal tracts. A similar narrow zone of surviving liver cells was also seen in the subcapsular area. In two cases, the infarcts were between 48 and 72 hr old and three definite zones were identified. The central necrotic zone was surrounded by a zone of inflammatory reaction. Outside the inflammatory zone was a variable zone of partial necrosis in which intact portal tracts were surrounded by a narrow rim of viable liver cells. In one case, the infarcts were about 2 weeks old. These involved the regenerative nodules of macronodular cirrhosis. The cirrhosis was complicated by the development of hepatocellular carcinoma with extensive portal vein thrombosis. The size of the infarcts varied from those that involved the entire lobe to one that was approximately 0.5 cm in size. Mild fatty change occurred in the surviving liver cells of four patients, and cholestasis occurred in four patients. The causes of infarction included: ligation of the right hepatic artery; thrombosis of the hepatic, celiac, splenic, and superior mesenteric veins; thrombosis of the hepatic, celiac, splenic, and superior mesenteric arteries and thrombosis of the portal vein; and thrombosis of the main portal vein and intrahepatic branches. Hepatic infarction may not be as uncommon as has been previously suggested.

0548 SELECTION OF DISCRIMINATORY BIOCHEMICAL VARIABLES FOR THE DIAGNOSIS OF INTRAHEPATIC CHOLESTASIS, EXTRAHEPATIC CHOLESTASIS AND LIVER CANCER. (Fre.) Plomteux, G.; Toulet, J. (Service de Chimie Medicale, 1, rue des Bonnes-Villes, 4000 Liege, Belgium). *Arch. Fr. Mal. App. Dig.* 64(4): 317-324; 1975.

A method for selecting a manageable subset of variables is proposed that would preserve the same amount of information as the conventional 30 variables routine for liver diagnosis. The clinical samples included 15 icteric patients with primary or secondary liver carcinoma, but without extrahepatic obstruction, 33 icteric patients with extrahepatic obstruction, and 49 icteric cases with intrahepatic cholestasis. The controls consisted of 100 patients without hepatobiliary involvement. Determination was made on the basis of a preferred subset obtained from the combination of four tests with six variables, whose discriminatory function was compatible with the criteria of variance and covariance. The 10 factors included alkaline phosphatase, 5-nucleotidase, thymol, GPT, and glutamic dehydrogenase, all of which discriminate intrahepatic cholestasis from extrahepatic obstruction and tumor, and esterases-A, total LDH, iso-LDH-4, ornithine carbamoyl-transferase, and isocitric dehydrogenase, all of which, along with glutamic dehydrogenase, differentiate extrahepatic cholestasis from tumors. These 10 variables were 93% diagnostic of the cited clinical groups.

0549 STATUS REPORT ON PROPHYLAXIS OF WILSON'S DISEASE. (Fre.) Sternlieb, I. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461). *Bull. Acad. Natl. Med. (Paris)* 159(6): 479-483; 1975.

Diagnostic aspects of Wilson's disease are reviewed. The disease is presently understood to be the result of both chronic copper intoxication and a deficiency in ceruloplasmin (CP) synthesis. Diagnosis is biochemically possible, and the specific therapy is D-penicillamine. Genetically, it was formerly assumed to have homozygous expression only. This view is currently not so diagnostically unequivocal, since at least 10% of the heterozygotes bear homozygous traits, and 5% of the homozygotes carry homozygous traits. Light microscopy of liver punch biopsies helps to confirm the biochemical values, but ultrastructural findings of mitochondrial lesions, where steatosis is microscopically frank, is pathognomic. In a study of 80 apparently healthy subjects who were biochemically borderline, 76 were given D-penicillamine (1 g/day x 365, minimum). Of the 76, 60 had reduced CP and elevated hepatic copper; 3 had normal CP, elevated transaminases, and increased hepatic copper; 8 had diminished CP and other biochemical anomalies; and 5, otherwise identical to the first group, had Kayser-Fleischer rings without clinical evidence of disease. Complications occurred in three cases: nephrosis, nephrocalcinosis, and perforating elastosis. In no case was there physical or intellectual retardation.

0550 CHENODEOXYCHOLIC ACID INHIBITS INCREASED CHOLESTEROL AND CHOLESTANOL SYNTHESIS IN PATIENTS WITH CEREBROTENDINOUS XANTHOMATOSIS. (Eng.) Salen, G.; Meriwether, T. W.; Nicolau, G. (Veterans Hosp., East Orange, NJ 07019). *Biochem. Med.* 14(1): 57-74; 1975.

The effects of chenodeoxycholic acid (CDCA) on cholesterol and cholestanol biosynthesis were evaluated in two subjects with cerebrotendinous xanthomatosis (CTX) by isotope kinetic techniques and in one subject by hepatic enzyme analysis. Sterol-specific-activity decay curves conformed to two-pool models, after i.v. pulse labeling with [4-^{14}C]cholesterol and [1,2-^{3}H]cholestanol, before and during treatment with CDCA (0.75 g/day). Calculations of daily production rates and of the size of the rapidly exchangeable kinetic pools of cholesterol and cholestanol were compared during both periods. Since diets contained no cholestanol and were low in cholesterol (<45 mg/day), production rates approximated daily synthesis. During CDCA treatment, average plasma cholestanol decreased 45%, and plasma cholesterol rose 23%. Average cholestanol synthesis decreased from 53 to 14 mg/day, and average cholesterol synthesis was reduced from 1,036 to 434 mg/day. In one CTX subject, the hepatic activity of 3-hydroxy-3-methylglutaryl coenzyme A reductase declined 54% after 7 days of bile acid treatment. These data indicate that CDCA suppressed elevated cholesterol and cholestanol synthesis in CTX, and suggest that this primary bile acid may be useful in preventing the clinical progression of the disease.

0551 MULTIPLE LIVER ABSCESSES. (Pol.) Sawa, A.; Paplinski, Z.; Zaorska-Rajca, J. (Z Klinika Torakochirurgiczna Instytutu Chirurgii AM, 20-090 Lublin, ul. Jaczewskiego 8, Poland). *Pol. Przegl. Chir.* 48(2):139-143; 1976.

0552 SIGNIFICANCE OF INVESTIGATIONS OF STARTING MECHANISMS OF BLOOD COAGULATION IN ALVEOCOCCOSIS AND OTHER LIVER DISEASES. (Rus.) Tumko, G. V. (Propedeutic Dept. Internal Diseases and General Surgery, Altai Medical Inst., Barnaul, USSR). *Klin. Med. (Mosk.)* (1):117-122; 1976.

0553 PERFORATION OF ECHINOCOCCUS CYSTS OF THE LIVER INTO THE ABDOMINAL CAVITY. (Rus.) Dedenko, I. K. (Kadiev Oncological Dispensary, Voroshilovgrad Oblast, Kadiev, USSR). *Vestn. Khir.* 116(4):42-44; 1976.

0554 BIOLOGICAL DIAGNOSIS OF PRIMARY AND SECONDARY LIVER CANCER. (Fre.) Plomteux, G.; Toulet, J. (Service de Chimie Medicale, rue des Bonnes-Villes, 1, B 4000 Liege, Belgium). *Ann. Gastroenterol. Hepatol.* 12(1):65-78; 1976.

0555 CURRENT EXPERIENCE WITH INFUSION CHEMOTHERAPY OF HEPATIC CANCER. (Eng.) Watkins, E. (Lahey Clinic Foundation, Boston, MA). *Panminerva Med.* 17(9/10):294-295; 1975.

0556 TREATMENT OF PRIMARY AND SECONDARY LIVER CANCER BY PROTRACTED ARTERIAL CHEMOTHERAPY. (Eng.) Pettavel, J. (Service de Chirurgie de Universite, Lausanne, Switzerland). *Panminerva Med.* 17 (9/10):296-298; 1975.

0557 FOUR AND ONE HALF YEAR CANCER-FREE SURVIVAL AFTER AMBULATORY ARTERIAL INFUSION OF 5-FLUOROURACILE FOR CANCER IN THE LIVER. (Eng.) Anderson, J. M.; Patrick, R. S.; Short, D. W.; Mackey, W. A. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Panminerva Med.* 17(9/10):339-346; 1975.

0558 STUDIES ON PRECANCEROUS LIVER CELL POPULATIONS AND THEIR IDENTIFICATION. Farber, E. *In: Fundamentals of Cancer Prevention. The 6th International Symposium of the Princess Takamatsu Cancer Research Fund. November 11-13, 1975.* Princess Takamatsu Cancer Research Fund. (Tokyo, Japan): pp. 25-27; 1975.

0559 STIMULATING EFFECT OF PORTACAVAL SHUNT ON INTRAHEPATIC AND EXTRAHEPATIC MORRIS HEPATOMAS. (Eng.) Reichle, F. A.; Noval, J. J.; Reichle, R. M.; Rao, N. S.; Obando, M.; Morris, H. P. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Surg. Forum* (26):433-435; 1975.

0560 SERUM AND URINE ZINC ALTERATIONS IN PRIMARY AND SECONDARY CANCER OF THE LIVER [Abstract]. (Eng.) Karoutsos, K.; Nakos, A.; Dariotis, A.; Pougouras, P. (Hippokration General Hosp., Athens, Greece). *Digestion* 12(4/6):317; 1975.

0561 A BENIGN HEPATOCELLULAR ADENOMA TREATED BY EXTENDED RIGHT LOBECTOMY. (Eng.) Sivula, A.; Lempinen, M. (Univ. Central Hosp., Helsinki, Finland). *Ann. Chir. Gynaecol. Fenn.* 65: 46-51; 1976.

0562 SMALL-BOWEL METASTASIS FROM BILE DUCT CARCINOMA WITH COINCIDENTAL CONGENITAL ABSENCE OF GALLBLADDER [Abstract]. (Eng.) Gurll, N. (Walter Reed Army Inst. Res., Washington, DC 20012). *Postgrad. Med.* 59(3):229-231; 1976.

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0564 CHOLELITHIASIS AND INTERRUPTED ENTEROHEPATIC CIRCULATION. FIVE CASES OF OBSTRUCTIVE JAUNDICE DUE TO PANCREATIC CARCINOMA WITH CHOLELITHIASIS. (Eng.) Chawla, S. K.; Lo Presti, P. A.; Chawla, K. (Queens Hosp. Center, CMC Affil., 82-68 164th St., Jamaica, NY 11432). *Am. J. Gastroenterol.* 64(6):478-483; 1975.

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0566 EFFECT OF HEPARIN ON SERUM LIPOPROTEIN-X IN CHOLESTASIS [Abstract]. (Eng.) Bacardi, R.; Ras, M. R.; Frison, J. C.; Masdeu, S.; Rubies-Prat, J. (Dept. Internal Medicine and Biochemistry, Ciudad Sanitaria de Seguridad Social, Universidad Autonoma, Barcelona, Spain). *Digestion* 12(4/6):263; 1975.

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0568 STEROIDS SULPHATES IN PLASMA OF WOMEN WITH INTRAHEPATIC CHOLESTASIS OF PREGNANCY [Abstract]. (Eng.) Giusti, G.; Piccinino, F.; Ricciardi, I.; Del Rio, G.; Sagnelli, E.; Manzillo, G. (1st Medical Sch., Univ. Naples, Naples, Italy). *Digestion* 12(4/6):305-306; 1975.

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0256, 0257, 0259, 0260, 0261, 0263, 0264,
0265, 0266, 0270, 0272, 0274, 0276, 0279,
0282, 0312, 0368, 0404, 0427, 0522, 0523,
0524, 0525, 0539, 0675, 0676, 0693, 0694,
0699, 0709, 0730, 0756, 0775, 0820, 0841.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

0637 NO EVIDENCE OF LACTASE DEFICIENCY RELATED TO PHOTOTHERAPY OF JAUNDICED INFANTS [Letter to Editor]. (Eng.) Chung, C. M.; Kong, Y. F. (Princess Margaret Hosp., Kowloon, Hong Kong). *N. Engl. J. Med.* 295(26):1483; 1976.

0638 PIGMENT IN DUBIN-JOHNSON SYNDROME (DJS) IS NOT MELANIN [Abstract]. Swartz, H. M.; Sarna, T.; Varma, R. R. (Medical Coll. Wisconsin, Milwaukee, WI). *Clin. Res.* 25(3):319A; 1977.

See also, 0267, 0545.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

0639 CHOLESTATIC HEPATITIS WITH A CHRONIC COURSE. SEVEN CASES. (Fre.) Frexinos, J.; Rumeau, J. L.; Pascal, J. P.; Tournut, R.; Suduca, P.; Ribet, A. (Hopital de Purpan, F 31052 Toulouse Cedex, France). *Nouv. Presse Med.* 5(1):19-22; 1976.

The clinical picture, paraclinical data, hepatobiliary histology, and therapeutic modalities in seven patients with chronic cholestatic hepatitis are generalized. The duration of disease was between 18 and more than 36 months. There was no extrahepatic obstruction. Paraclinically, the bilirubin exceeded 100 mg/l, the serum lipids were equal to or greater than 15 g/l, the cholesterolemia was 4 g/l or higher, and the alkaline phosphatase was 500 IU/l or higher. There was a female predominance (6/7). The Australia antigen and the smooth muscle and mitochondrial antibodies were absent. There was a marked reduction in the number of "permeable" bile ducts at the level of the portal spaces. The course of the disease was relatively little influenced by a variety of treatments. Cholestyramine was administered in three cases with completely misleading results. Duodenal intubation was successful for 2 months in six cases. Doses of 60-80 mg/day methyl prednisolone were continued for 2 months, followed by 20 mg/day prednisolone and 50 mg/day azathioprine for more than 1 yr. After an interval of 18-24 months, four patients had completely normal liver function, with no sign of persistent necrosis. In the remaining three cases, a cholestatic syndrome persisted 28-36 months, with transaminase elevations between 100 and 200 IU/l.

0640 QUANTITATIVE ENZYME HISTOCHEMISTRY OF NORMAL AND INJURED LIVERS PART 2; ULTRAMICROCHEMICAL DETERMINATION OF NADP-DEPENDENT ISOCITRATE AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE IN THE LOBULES OF NORMAL AND INJURED HUMAN LIVER. (Eng.) Suzuki, K. (Ehime Univ., Sch. Medicine, Shigenobu-cho, Ehime 791-02, Japan). *Acta Histochem. Cytochem.* 9(1):30-36; 1976.

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See also, 0076, 0700.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

0643 FULMINATING HEPATITIS TREATED BY PLASMAPHERESIS. (Fre.) Boland, J.; Broux, R.; Bury, J.; Pirotte, J. (Institut de Medecine, Hopital de Baviere, Boulevard de la Constitution 66, B-4000 Liege, Belgium). *Acta Gastroenterol. Belg.* 38(5/6):207-217; 1975.

The case history of a fulminating serum hepatitis managed by plasmapheresis is presented. A 24-yr-old woman with an unexceptional medical history presented with asthenia, arthralgia, constipation, vomiting, subicterus, and hepatomegaly. The icterus was progressive and the patient became increasingly torpid and finally comatose, with alternating hypo- and hypertonicity. The cholestasis was confirmed para-clinically. Initial treatment included high-dose corticosteroids and neomycin (1 g x 3). The patient was found to be serologically positive for Australia antigen. An initial plasmapheresis of 10,500 liters elicited a regression of coma and icterus. A second plasmapheresis restored consciousness, and the patient was released in 2 weeks with only moderately elevated transaminases.

0644 CONFERENCE ON VIRAL HEPATITIS. (Ita.) Valcurone, G.; Tassi, G. C. (Divisione Scientifica, Istituto Sieroterapico Milanese S. Belfanti, Milan, Italy). *Terapia (Torino)* 60(434): 136-143; 1975.

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Chronic Hepatitis

)677 CLINICAL EXTRAHEPATIC MANIFESTATIONS OF
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:IRRHOSIS. (Fre.) Buffet, C.; Etienne, J. P.
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lopital Antoine-Beclere, F 92140 Clamart, France).
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. survey of the past decade's literature on the
requency, clinical picture, and physiopathology
f extrahepatic signs in chronic hepatitis andd
rimary biliary cirrhosis is presented. In chronic
epatitis, 17% of the cases demonstrated rheumatoid
igns and 80% of these were arthralgia and arthritis;
2% showed renal signs, especially tubular acidosis
nd chronic glomerulonephritis; 6.2% had colonic
ymptoms (ulcerative colitis); 20% had Sjogren's
yndrome; 10% had thyroid disorders (Hashimoto's
hyroid, hyperthyroidism, simple goiter); 17% had
ıtaneous symptoms, especially melanoderma; and
9% had pleuropulmonary symptoms, especially pleurisy
ıd alveolar lung fibrosis. In primary cirrhosis,
ıe distribution is 4% rheumatoid, 2% renal, 2%
olonic, 3.6% scleroderma, 3% Sjogren's syndrome,
% thyroid, and 2% pleuropulmonary. No correlations
ppear possible.

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LIVER AND BILIARY TRACT

Alcoholic Liver Disease

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See also, 0271, 0577, 0602, 0687, 0688, 0689, 0714.

LIVER AND BILIARY TRACT

Cirrhosis

0697 187 PORTACAVAL ANASTOMOSES. A STATISTICAL ANALYSIS OF PROGNOSTIC FACTORS. II. COMPARATIVE STUDY OF THE RESULT OF ANASTOMOSIS WITH OR WITHOUT INTERRUPTION OF THE PORTAL VEIN. DISCUSSION. (Fre.) Leger, L.; Lenriot, J. P.; Duclos, J. P.; Lemaigre, G. (Hopital Cochin, 16, rue de Teheran, 75-Paris, France). *J. Chir. (Paris)* 109(4):429-450; 1975.

A comparative statistical study of survival rates after anastomosis with and without portal vein interruption is presented. The clinical sample included 119 end-to-side anastomoses and 4 end-to-end portorenal anastomoses. The postoperative mortality was 26 of 123, due primarily to hepatic insufficiency. Of 94 patients surviving 2 postoperative months, 58 died within 6 months to 12 yr (average, 3.75 yr) and 36 are still living. Among the 58, progressive or sudden hepatic deficit was responsible for death in 39 cases. Patient age was the most important factor determining short-term survival. Sex and the permeability or thrombosis of the shunt were significant in determining longer term survival. At 1 yr, 35% of the men and 14% of the women had succumbed. Those with permeable shunts had a 1-yr mortality of 27%, and those wit thrombosed shunts, a 47% mortality. Of 80 1-yr survivors, the result was satisfactory in 48, moderately successful in 11, and poor in 21; 15% experienced thrombosis at the anastomosis. Portal continuity was preserved in 64 patients, including 48 with portacaval side-to-side anastomoses, 14 with end-to-side anastomoses, and 2 with side-to-end anastomoses. In this group, the postoperative mortality was 19 in 2 months, mainly from hepatic deficit. The biological status of the host was the primary factor in immediate postoperative survival. Survival patterns showed that 45 patients lived 2 months or more, including 14 who lived up to 5 yr; 29 died, primarily from hepatic insufficiency. The surgical result was satisfactory in 16 cases, moderately successful in 11, and poor in 9. The anastomotic thrombosis rate was 19-35%. Survival favors conservation of the portal trunk and end-to-side anastomosis.

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The clinical course and prognosis in 31 cirrhotic patients with functional renal failure (FRF) were compared with those in 34 cirrhotic control patients with ascites and normal creatinine clearance. The differential diagnosis of FRF and other types of renal dysfunction occurring in cirrhotic patients is discussed with reference to 17 FRF patients, 5 patients with acute tubular necrosis, and 9 patients with chronic renal disease. The therapeutic approach in seven additional FRF patients is described. In ll of the 31 cirrhotic FRF patients, renal failure followed a rapidly progressive course after hospitalization with a progressive increase in plasma urea concentration, low urinary sodium concentration, nd a marked fall in urine volume. All 11 had a complication (hemorrhage, infection) or had undergone a procedure (cholecystectomy) that could have predisposed to FRF. A second group of 11 patients (group 2) was admitted with ascites and renal failure, for which no reason could be found. Most lost their ascites with diuretic therapy. In the last nine atients, the initial evolution was identical to that of group 2 until some complication or operation occurred that hastened the course of the renal failure. wenty-three of the 31 patients died, while only 3 of the 34 cirrhotic controls died. When the eight surviving FRF patients in group 2 were followed up after 11 months, over 50% ad died. This death rate was not reached in the ontrols until 24 months of follow-up. Seven FRF atients were treated with plasma volume expanders human plasma or serum albumin). Furosemide (200 mg, -hourly) was administered i.v. The dosage was doubled f diuresis had not ensued or if there was a rise in entral venous pressure, but it was gradually tapered ccording to the diuretic response. Preliminary esults of treatment of FRF with plasma volume xpansion in combination with high doses of furo- emide demonstrate a long-term improvement in renal unction.

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0721 DIRECT MESENTERICO-PORTOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF PORTAL HYPERTENSION. (Ger.) Engert, J.; Klein, U.; Hollmann, G.; Tinschmann, P. (Univ.-Kinderklinik Munchen, Munich, W. Germany). *Z. Kinderchir. Grenzgeb.* 16(1):87-90; 1975.

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See also, 0271, 0272, 0576, 0577, 0602, 0677, 0678, 0686, 0687, 0688, 0692.

Gallbladder and Biliary Tract Diseases

0723 SPECTRUM OF CHOLANGITIS. (Eng.) Saik, R. P.; Greenburg, A. G.; Farris, J. M.; Peskin, G. W. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Am. J. Surg.* 130(2): 143-150; 1975.

Experience with 36 cases of acute cholangitis from among 402 patients with biliary disease seen in a 3-yr period is presented. The symptoms included spiking fever (94.4%) or chills (77.7%); elevated bilirubin (91.6%), alkaline phosphatase (88.8%), and and white blood cell count (97.2%); history and ce evidence of bile duct obstruction or manipulation; ence and evidence of sepsis. Pain was present in all cases. Thirty patients had biliary calculus, and four had associated pancreatitis. Cholangitis developed in five patients after radiological procedures. Bile cultures for organisms were found in 93% of the patients, and more than 50% of these had growth of more than one organism. Of the 28 patients who underwent surgery, only 5 did not have exploration of the common bile duct, and 4 of these died. Surgical procedures included cholecystectomy (20 patients), cholecystotomy (4), common bile duct exploration (23), operative cholangiography (23), sphincteroplasty and choledochoduodenostomy (3 each), and cholecystoduodenostomy (1). There were three other operative deaths; two were from hemorrhage, and the third occurred at home in a patient with adenocarcinoma of the gallbladder and common duct stones. All patients who died underwent a period of shock. Early diagnosis and confirmation, early administration of antibiotics, correction of shock, low cardiac output, and evaluation of possible clotting abnormalities are essential in the management of acute cholangitis in elderly patients. Operative intervention including duct drainage was recommended in all cases, except those with immediate response to antibiotics, along with operative bile and peritoneal culture and satisfactory operative cholangiogram. Postoperative monitoring of vital signs and careful preparation after ductal manipulation are also stressed.

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism Digestive Diseases. This specialized information medium has been initiated to fill an existing great need i the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tr Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevan to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)

ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0858 THE AUTONOMIC INNERVATION OF THE OESOPHAGUS. (Eng.) Smith, B. (No affiliation given). *Clin. Gastroenterol.* 5(1):1-14; 1976.

0859 IX. ABSORPTION OF SUGAR, FAT, AND PROTEIN IN THE UPPER INTESTINE IN RELATION TO LOADS, TRANSIT TIMES, AND THE ENDOGENOUS DILUTION. (Eng.) Johansson, C. (No affiliation given.) *Mt. Sinai J. Med. N.Y.* 43:73-83; 1976.

0860 EFFECT OF ANTRECTOMY ON ILEAL HYPERPLASIA AFTER JEJUNECTOMY IN THE RAT [Abstract]. (Eng.) Weser, E.; Hughes, W.; Tawil, T. (Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 24(1):46A; 1976.

0861 A NEW CONCEPT OF THE ANATOMY OF THE ANAL SPHINCTER MECHANISM AND THE PHYSIOLOGY OF DEFECATION. IV. ANATOMY OF THE PERIANAL SPACES. (Eng.) Shafik, A. (Faculty Medicine, Cairo Univ., Cairo, Egypt). *Invest. Urol.* 13(6):424-428; 1976.

0862 IN VIVO INDUCTION OF TIGHT JUNCTION PROLIFERATION IN RAT LIVER. (Eng.) Montesano, R.; Gabbiani, G.; Perrelet, A.; Orci, L. (Institut d'Histologie et d'Embryologie et Departement de Pathologie, Universite de Geneve, 1211, Geneve 4, Switzerland). *J. Cell Biol.* 68(3):793-798; 1976.

0863 HISTOCHEMISTRY OF CANINE INTRAHEPATIC BILE DUCTS [Abstract]. (Eng.) Cook, B. H.; Granger, D. N.; Granger, H. J.; Turner, M. D.; Taylor, A. E. (Univ. Mississippi Medical Center, Jackson, MS 39216). *Fed. Proc.* 35(3):382; 1976.

0864 NONUNIFORM DISTRIBUTION OF SODIUM IN THE RAT HEPATOCYTE. (Eng.) Hooper, G.; Dick, D. A. T. (Dept. Anatomy, Univ. Dundee, Dundee, Scotland). *J. Gen. Physiol.* 67(4):469-474; 1976.

0865 IMMUNOLOGICAL SIMILARITY OF THE NADH-CYTOCHROME c ELECTRON TRANSPORT SYSTEM IN MICROSOMES, GOLGI COMPLEX AND MITOCHONDRIAL OUTER MEMBRANE OF RAT LIVER CELLS. (Eng.) Borgese, N.; Meldolesi, J. (C.N.R. Center Cytopharmacology, Univ. Milan, Milan, Italy). *FEBS Lett.* 63(2):231-234; 1976.

0866 MATURATION OF FETAL STOMACH IN ORGAN CULTURE [Abstract]. (Eng.) Yeomans, N. D.; Trier, J. S.; Moxey, P. C. (Harvard Medical Sch., Boston, MA). *Clin. Exp. Pharmacol. Physiol.* 3(3):245; 1976.

0867 FUSION OF THE ENVELOPE OF MUCOUS DROPLETS WITH THE LUMINAL PLASMA MEMBRANE IN ACINAR CELLS OF THE CAT SUBMANDIBULAR GLAND. (Eng.) Tandler, B.; Poulsen, J. H. (Sch. Dentistry, Case Western Reserve Univ., Cleveland, OH 44106). *J. Cell Biol.* 68(3):775-781; 1976.

0868 INTESTINAL CELL PROLIFERATION DURING FRACTIONATED ABDOMINAL IRRADIATION. (Eng.) Hagemann, R. F. (Allegheny General Hosp., Pittsburgh, PA 15212). *Br. J. Radiol.* 49(577):56-61; 1976.

See also, 0918, 0974, 0975, 1063, 1068, 1084, 1088, 1104, 1127, 1131, 1173, 1298, 1315.

ABSORPTION · EXCRETION · TRANSPORT

0869 UNIDIRECTIONAL UPTAKE OF IRON ACROSS INTESTINAL BRUSH BORDER. (Eng.) Sheehan, R. G. (Veterans Admin. Hosp., Dallas, TX 75216). *Am. J. Physiol.* 231(5):1438-1444; 1976.

The significance of the uptake step by the intestinal mucosa in the control of iron absorption was investigated by measuring the unidirectional uptake of iron on proximal small intestinal segments from sodium pentobarbital anesthetized female Sprague-Dawley rats. The method employed a nonabsorbable marker of adherent incubating medium, and the studies were performed during the linear time period of instantaneous uptake. Uptake was linear over the concentration range 0.1-10 mM, from three iron complexes. The rate varied with the bioavailability of the iron in each complex. The temperature coefficient was 1.0-1.3. Uptake rates were similar in all segments of small intestine. Uptake was not increased in segments from iron-deficient animals or rats with hemolytic anemia. Cobalt did not inhibit the uptake rate. These studies demonstrate that the uptake of nonheme iron by the small intestinal mucosal cell is by passive diffusion and further indicate that the uptake step does not contribute significantly to the mucosal control of iron absorption.

0870 IONIC REQUIREMENTS FOR THE ACTIVE ILEAL BILE SALT TRANSPORT SYSTEM. (Eng.) Gallagher, K.; Mauskopf, J.; Walker, J. T.; Lack, L. (Duke Univ. Medical Center, Box 3185, Durham, NC 22710). *J. Lipid Res.* 17(6):572-577; 1976.

Taurocholate transport by everted guinea pig ileal gut sacs was studied in physiological media containing graded amounts of sodium ions. Significant uphill transport of taurocholate was observed when the bulk of NaCl was replaced by osmotic equivalents of mannitol or choline chloride. Seventy-seven percent of control transport activity was observed when 36 mEq/l of Na^+ were present in the incubation medium, with mannitol acting as the isosmotic replacement, and 74% of the control transport was retained when 31 mEq/l of Na^+ were present in the incubation medium with choline chloride acting as the osmotic replacement. Lowering the Na^+ concentration to 19 mEq/l (84% replacement of Na^+) still allowed for 69% of the uphill transport observed in the control incubations. Taurodehydrocholate transport by ileal everted sacs was more sensitive to decreased Na^+ concentrations; 29% of control transport was observed at 31 mEq/l of Na^+. A kinetic analysis comparing the transport of taurocholate with taurodehydrocholate, the triketo analogue, at different concentrations of Na^+ indicated that the apparent affinity of the transport system for Na^+ is greater in the presence of taurocholate than in the presence of taurodehydrocholate. The ability of taurodehydrocholate to depress taurocholate transport is less in media of low Na^+ concentration. *In vivo* intestinal perfusion studies demonstrated that the depression of taurocholate absorption following Na^+ removal is reversible. These results support the hypothesis that Na^+ has a physiological role in intestinal bile salt transport, and that the affinities of the anionic bile salt and the sodium cation for the transport system are cooperative, in that one enhances the binding of the other.

0871 EVIDENCE THAT PANCREATIC PROTEASES ENHANCE VITAMIN B_{12} ABSORPTION BY ACTING ON CRUDE PREPARATIONS OF HOG GASTRIC INTRINSIC FACTOR AND HUMAN GASTRIC JUICE. (Eng.) Toskes, P. P.; Smith, G. W.; Francis, G. M.; Sander, E. G. (Gainesville Veterans Hosp., Gainesville, FL 32602). *Gastroenterology* 72(1):31-36; 1977.

The mechanism by which the administration of exogenous pancreatic extract or trypsin corrects the vitamin B_{12} malabsorption in patients with pancreatic exocrine insufficiency was investigated in three patients. Crude preparations of hog gastric intrinsic factor or the patients' own previously collected gastric juices administered with labeled vitamin B_{12} did not enhance vitamin B_{12} absorption. However, when these sources of gastric intrinsic factor were incubated with three-times-crystallized preparations of insolubilized bovine trypsin or chymotrypsin, the proteolytic enzymes were removed by centrifugation, and the preparations of gastric intrinsic factor were readministered to these patients, the absorption of vitamin B_{12} was markedly enhanced. Studies of hog gastric intrinsic factor before and after exposure to proteolytic enzymes failed to show any difference on Sephadex chromatography or polyacrylamide gel electrophoresis or on its affinity for vitamin B_{12} or the ileal receptor in guinea pigs. These investigations demonstrate that: gastric intrinsic facto
as secreted by subjects with pancreatic insufficienc
or obtained from hog pyloric mucosal extracts, is ineffective in promoting vitamin B_{12} absorption in patients with pancreatic insufficiency, and incubati
of crude preparations of gastric intrinsic factor with insolubilized pancreatic proteases modified these preparations of gastric intrinsic factor in a
as yet undefined manner, allowing them to enhance vitamin B_{12} absorption.

0872 ALTERNATIVE METHODS OF ANIMAL SACRIFICE: THE EFFECT ON INTESTINAL FUNCTION IN VITR
(Eng.) Johnson, I. T. (Dept. Chemistry, Univ. Asto
in Birmingham, Gosta Green, Birmingham, B4 7ET, England). *Experientia* 32(3):347-348; 1976.

0873 RAPID DISCRIMINATION OF REWARDING NUTRIEN
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See also, 0988, 1003, 1661.

MOTILITY

0911 INTRAGASTRIC PRESSURE/VOLUME RELATIONSHIP IN THE NORMAL HUMAN STOMACH. (Eng.) Stadaas, J. O. (Ulleval Univ. Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(2):135-140; 1975.

The intragastric pressure/volume relation was studied in eight healthy subjects using a large flaccid balloon sensitive to pressure variations in the stomach. Recordings of intragastric pres-

ure variations were made for 15-min periods,
tarting with the empty balloon and following each
uccessive increment of 150 ml water up to 600 ml.
ecordings were also made for each step of volume
eduction by 150 ml until the bag was empty. Basal
ressure increased gradually and slowly with volume
ncrements and fell in a reverse manner when the
tomach was emptied. Only small contractile
mplitudes were regularly seen when the balloon
as empty (3/min, 2 cm water pressure). Rhythmic
mplitudes gradually increased with volume incre-
ents, reaching their maximum with 300 to 600 ml
ater. The sum of the amplitudes increased to
aximal activity at 300 ml. The number of contrac-
ions also increased during the filling phase to
maximum frequency at 300 ml. The mean height of
mplitudes increased with augmented volume up to
00 ml. Planimetry showed increased contractile
ctivity with volume loads to a peak at 450 ml and
00 ml for filling and emptying, resp. I.v. injec-
ion of atropine sulfate (0.01 mg/kg) abolished
hythmic contractions and reduced the parameters
xpressing contractile activity almost to zero,
hereas the basal pressure was somewhat elevated.
.v. injection of insulin (0.2 IU/kg) induced
trong rhythmic contractions and increased all para-
eters of contractile activity, but had no effect
basal pressure. These results demonstrate the
sefulness of the flaccid intragastric balloon in
e study of gastric motility responses.

12 FACTORS AFFECTING CONTRACTION OF THE SMOOTH
MUSCLE OF THE GALLBLADDER--IN PARTICULAR,
E EFFECT OF CALCIUM. (Jpn.) Yoshida, M.; Kudoh,
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ntractions of guinea pig gallbladder were studied
vitro by slitting the gallbladder open along the
ngitudinal axis on the liver side, and mounting
as a flat piece in a constant temperature bath
1 C, 30 ml volume) containing Krebs solution. A
s mixture of 95% O_2, 5% CO_2 was passed through the
lution. Electrical and chemical stimulations were
fected; Ca^{2+} concentrations in the Krebs solution
re varied by replacing $CaCl_2$ by equimolar amounts
NaCl. Maximum tensions increased upon increasing
rious electrical stimulation factors: frequency,
-30 Hz; duration, 10-20 sec; and voltage, 10-60 V.
nsions increased as temperature was increased from
to 42 C, and reached a maximum about 38-40 C,
creasing thereafter. Tensions increased with
creasing Ca^{2+} concentrations, and reached a maximum
3-4 mM, decreasing thereafter. Even after 7 hr
soaking, maximum tension values from identical
ts of electrical stimulations hardly changed.
dition of tetrodotoxin (TTX: 1×10^{-7} g/ml) de-
eased maximum tension to 10% of the maximum obtain-
le in normal Krebs solution. Muscular cramping
curred upon introduction of K^{1+} (40 mM) or acetyl-
oline chloride (ACh: 1×10^{-7} g/ml) to the Krebs
lution. However, upon removal of Ca^{2+} ions from
e Krebs solution, K cramping and ACh cramping
fects disappeared after 90 min. TTX (3×10^{-7} g/ml)
d no effect on K or ACh cramping. It seems that
ternal presence of Ca^{2+} ions is necessary for
intenance of tension.

0913 EFFECTS OF PENTAZOCINE ON GASTRO-INTESTINAL SMOOTH MUSCLE.--II) ILEUM AND ODDI'S SPHINCTER. (Eng.) Teggia, M.; Perucca, E.; Tonini, M. (Inst. Medical Pharmacology, Univ. Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(9):591-594; 1976.

Because most narcotic analgesics can produce spasm of Oddi's sphincter in man, the effect of pentazocine was studied in the rabbit ileum and Oddi's sphincter. Pentazocine produced a dose-dependent decrease in the frequency of the slow waves in isolated ileum. At concentrations ranging from 1×10^{-6} to 5×10^{-5} g/ml, pentazocine decreased the number of spikes superimposed on each slow wave and reduced the longitudinal muscle tonus. Higher concentrations increased the frequency of the large spikes and of the contractions of the circular layer. In the presence of cerulein (1.10^{-9} g/ml), pentazocine temporarily abolished both the large spikes and the cerulein-induced intraluminal pressure. The addition of piperoxan, propranolol, or methysergide (all at 1.10^{-6} g/ml) did not abolish the inhibitory effect of pentazocine, ruling out the presence of an adrenergic or serotoninergic inhibitory mechanism. In the presence of tetrodotoxin, pentazocine caused contraction of longitudinal muscle, indicating that pentazocine does not affect the acetylcholine release from the ileum. Pentazocine concentrations of up to 1.10^{-4} g/ml caused no contraction at Oddi's sphincter, and in some experiments, even increased the flow rate across the sphincter. The findings suggest that pentazocine acts directly on ileal smooth muscle and that it is not spasmogenic in the rabbit biliary tract.

0914 EFFECT OF A BARIUM MEAL ON RESTING GASTRO-OESOPHAGEAL SPHINCTER PRESSURE IN NORMAL HUMAN SUBJECTS. (Eng.) Boesby, S.; Pedersen, S. A. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 11(5):521-523; 1976.

The question of whether the ingestion of an x-ray contrast medium affects the basal gastroesophageal sphincter pressure was investigated in 10 healthy subjects. The mean basal sphincter pressure was 14 mm Hg. Twenty min after the subjects ingested 250 ml of contrast medium (150 ml barium sulphate at 0.7 g/ml and 100 ml barium sulphate at 1.0 g/ml, pH 3-5), there was a temporary but significant drop in sphincter pressure (to 10 mm Hg, $p<0.01$). These results may be due to the increase in intragastric volume following the ingestion of contrast medium. In those cases in which radiological evaluation of resistance against reflux is called for, the composition and pH of the contrast medium, the time schedule, and the degree of abdominal compression must be standardized.

0915 THE EFFECT OF INTRAVENOUS INFUSION OF SYNTHETIC HUMAN GASTRIN-I ON LOWER ESOPHAGEAL SPHINCTER (LES) PRESSURE IN THE DOG AND ITS RELATION TO GASTRIN LEVEL. (Eng.) Jennewein, H. M.; Hummelt, H.; Siewert, R.; Waldeck, F. (Boehringer Sohn, Pharmaforschung Biologie, D-6507 Ingelheim/Rhein, W. Germany). *Digestion* 14(4):376-380; 1976.

To demonstrate the relation between gastrin level and lower esophageal sphincter (LES) pressure, experiments with i.v. infusions of synthetic human gastrin-I (SHG-I) were performed in 24 anesthetized dogs. Following the ingestion of meat, serum gastrin rose from a mean basal level of 80 pg/ml to a mean maximum value of 310 pg/ml, using the antibody G-62029, and from a basal level of less than 5 pg/ml to 27 pg/ml, using antibody C-5. The administration of a single i.v. injection of pentagastrin and SHG-I (1 µg/kg) led to a prompt mean increase in sphincter pressure (45 mm Hg) and in gastrin levels (to 2,071 pg/ml with antibody C-5 and to 1,997 pg/ml with antibody G-62029). The administration of a continuous infusion of SHG-I (5 µg/kg/hr) produced a temporary increase in LES tone; gastrin levels rose to about 2,000 pg/ml using both antibodies. Physiological levels of gastrin were measured only using an infusion dose of 0.5 µg/kg/hr, which was below the threshold for increasing LES pressure. The results indicate that gastrin does not play a major role in the LES pressure regulation in the dog, but it is possible that gastrin supports or modulates other hormonal, neural, or mechanical factors giving change to the LES pressure.

0916 HIGH-SPEED ANALYSIS OF GASTROINTESTINAL MYOELECTRIC ACTIVITY [Abstract]. (Eng.) Barnett, T. G.; Wingate, D. L. (London Hosp. Medical Coll., Turner St., London D1 2AD, England). *J. Physiol.* 256(1):6P-7P; 1976.

0917 TRANSIT TIME MEASUREMENTS: IS A NEW METHOD REQUIRED? [Abstract]. (Eng.) Cummings, J. H.; Jenkins, D. J. A.; Wiggins, H. S. (Central Middlesex Hosp., London, NW10, England). *Gut* 17(5):387; 1976.

0918 PERISTALTIC REFLEX: SUPERSENSITIVITY TO CATECHOLAMINES. I) THE MUSCULAR SITE OF ACTION. (Eng.) Perucca, E.; Teggia, M.; Tonini, M. (Inst. Medical Pharmacology, Univ. Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(9):568-574; 1976.

0919 PERISTALTIC REFLEX: SUPERSENSITIVITY TO CATECHOLAMINES. II) THE INHIBITION OF THE NERVOUS STRUCTURES. (Eng.) Perucca, E.; Teggia, M.; Tonini, M. (Inst. Medical Pharmacology, Univ. Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(9):575-580; 1976.

0920 GASTRODUODENAL ELECTRICAL POTENTIAL CHANGES AND CONTRACTILE ACTIVITY IN BIRDS OF PREY [Abstract]. (Eng.) Duke, G. E.; Evanson, O. A. (Coll. Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55108). *Fed. Proc.* 35(3):303; 1976.

0921 DYNAMIC RESPONSE OF THE INTESTINAL SYMPATHETIC NERVE ACTIVITY TO MECHANICAL STIMULATION OF THE SMALL INTESTINAL SEGMENT [Abstract]. (Eng.) Ninomiya, I. (Sch. Medicine Hiroshima Univ., Kasumi-cho, Hiroshima, Japan). *Proc. Jpn. Acad.* 52(1):771-773; 1976.

0922 PROTECTION AFFORDED BETHANECHOL-CHALLENGED RAT GASTRODUODENAL JUNCTIONAL TISSUE BY PROGESTERONE [Abstract]. (Eng.) Bruce, L. A.; Danhof, I. E. (Southwestern Medical Sch., Dallas, TX 75235). *Fed. Proc.* 35(3):304; 1976.

0923 EFFECTS OF PENTAZOCINE ON GASTRO-INTESTINAL SMOOTH MUSCLE. I) COLON. (Eng.) Teggia, M.; Perucca, E.; Tonini, M. (Inst. Medical Pharmacology, Univ. Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(9):587-590; 1976.

0924 PROSTAGLANDINS AS MODULATORS OF INTESTINAL MOTILITY [Abstract]. (Eng.) Grubb, M. N.; Burks, T. F. (Univ. Texas Medical Sch., Texas Medical Center, Houston, TX). *Clin. Res.* 24(1):12A; 1976.

0925 A MANOMETRIC STUDY OF THE UPPER OESOPHAGUS IN THE DOG FOLLOWING CUFFED-TUBE TRACHEOSTOMY. (Eng.) Leverment, J. N.; Pearson, F. G.; Rae, S. (United Bristol Hosp., Bristol, England). *Br. J. Anaesth.* 48(2):83-90; 1976.

0926 THE CONTROLS OF OESOPHAGEAL MOVEMENT. (Eng.) Christensen, J. (No affiliation given). *Clin. Gastroenterol.* 5(1):15-27; 1976.

0927 THE INFLUENCE OF GASTROINTESTINAL HORMONES AND PROSTAGLANDINS ON THE LOWER OESOPHAGEA SPHINCTER. (Eng.) Fisher, R. S.; Cohen, S. (No affiliation given). *Clin. Gastroenterol.* 5(1):29-48; 1976.

0928 THE EFFECT OF CIMETIDINE ON LOWER ESOPHAGEAL SPHINCTER (LES) PRESSURE IN NORMAL SUBJECTS [Abstract]. (Eng.) Freeland, G. R.; Higgs, R. H.; Castell, D. O. (Gastroenterology Section, U.S. Naval Hosp., Philadelphia, PA). *Clin. Res.* 24(1):11A; 1976.

0929 THE EFFECT OF CIMETIDINE ON LOWER OESOPHAGEAL SPHINCTER PRESSURE IN MAN [Abstract]. (Eng.) Osborne, D. H.; Lennon, J.; Henderson, M.; Lidgard, G.; Carter, D. C. (Edinburgh Univ. Medical Sch., Edinburgh, England). *Gut* 17(5):388; 1976.

0930 RELATIONSHIP OF ABDOMINAL AND CERVICAL VAGAL ACTIVITY ON LOWER ESOPHAGEAL SPHINC FUNCTION [Abstract]. (Eng.) Matarazzo, S.; Snape, W., Jr.; Ryan, J.; Cohen, S. (Hosp. Univ. Pennsylva nia, Philadelphia, PA). *Clin. Res.* 24(3):288A; 1976.

0931 VAGAL AND NONVAGAL PATHWAYS FOR ESOPHAGEAL PERISTALSIS [Abstract]. (Eng.) Mukhopadhyay, A. K.; Weisbrodt, N. W. (Baylor Coll. Medicine, Houston, TX). *Clin. Res.* 24(1):12A; 1976.

0932 COMPUTER RECOGNITION OF CONTRACTIONS IN THE SMALL INTESTINE [Abstract]. (Eng.) Singerman, R. B. J.; Glover, J. R. (Iowa Inst. Hydraulic Res., Iowa City, IA). page 36; 1975. [available through National Technical Information Services, Washington, DC, Document No. PB-239 629/9WJ].

0933 SIMULTANEOUS RECORDING OF CIRCULAR AND LONGITUDINAL MUSCLE CONTRACTIONS OF THE CANINE JEJUNUM. (Eng.) Mendel, C.; Pousse, A.; Dauchel, J.; Schang, J. C.; Lambert, A.; Grenier, J. F. (U-61, INSERM, Avenue Moliere, F-67200 Strasbourg, Hautepierre, France). *Pfluegers Arch.* 363(3):273-274; 1976.

0934 MOTILITY DEPRESSED INTESTINAL PROPULSION FOLLOWING SELECTIVE JEJUNAL MYOTOMY IN THE RAT. (Eng.) Merlo, G.; Nano, M.; Villata, E. (Dept. Surgical Pathology, Univ. Turin, Via Veneto 14, I-10017 Montanaro/Torino, Italy). *Eur. Surg. Res.* 8(4):344-348; 1976.

0935 RELATIONSHIP BETWEEN SPONTANEOUS CHANGES IN COLONIC INTRALUMINAL PRESSURE AND PERIPHERAL INPUT TO IMG NEURONS [Abstract]. (Eng.) Weems, W. A.; Szurszewski, J. H.; Beeler, G. W. (Mayo Clinic and Foundation, Rochester, MN 55901). *Fed. Proc.* 35(3):303; 1976.

0936 POSSIBLE INVOLVEMENT OF PROSTAGLANDINS IN THE CONTRACTILE ACTION OF BRADYKININ ON RAT TERMINAL ILEUM. (Eng.) Crocker, A. D.; Willavoys, S. P. (Dept. Pharmacy, Univ. Aston, Birmingham, B4 7ET, U.K.). *J. Pharm. Pharmacol.* 28(1):78-79; 1976.

0937 ELECTRICAL STIMULATION OF THE LARGE INTESTINE OF PIEBALD MICE WITH HEREDITARY MEGACOLON [Abstract]. (Eng.) Brann, L.; Wood, J. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Fed. Proc.* 35(3):304; 1976.

0938 EFFECTS OF DRUGS AND HORMONES ON HUMAN COLON MUSCLE [Abstract]. (Eng.) Weiss, S. M.; Hughes, S. R.; Paskin, D. L.; Lipshutz, W. H. (Pennsylvania Hosp., Philadelphia, PA). *Clin. Res.* 24(3):293A; 1976.

0939 NON-CONTRACTILE MOVEMENT OF TANTALUM POWDER IN THE CANINE RECTUM. (Eng.) Margulis, A. R.; Stoughton, J. A.; Stein, L. A. (Dept. Radiology, Univ. California, San Francisco, CA). *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 125(1):244-250; 1975.

0940 FACTORS AFFECTING RELATIVE RATES OF GASTRIC EMPTYING OF GLUCOSE VS. FAT IN THE RAT [Abstract]. (Eng.) Trout, D. L.; Conway, E. S.; Putney, J. (ARS, Nutrition Inst., Beltsville, MD 20705). *Fed. Proc.* 35(3):417; 1976.

0941 OSMOLYTE AND TRYPTOPHAN RECEPTORS CONTROLLING GASTRIC EMPTYING IN THE DOG [Abstract]. (Eng.) Cooke, A. R.; Stephens, J. R.; Woolson, R. F. (Univ. Iowa, Iowa City, IA 52242). *Fed. Proc.* 35(3):303; 1976.

0942 ANTRAL DENERVATION IMPAIRS CANINE GASTRIC EMPTYING OF SOLIDS [Abstract]. (Eng.) Mroz, C. T.; Kelly, K. A. (Mayo Foundation, Rochester, MN 55901). *Fed. Proc.* 35(3):303; 1976.

0943 GASTRIC REFLUX MEASUREMENTS DURING DUODENAL INFUSION WITH SALINE, ACID AND FAT. (Eng.) Aste, H.; Molinari, F. (Ospedale San Martino, Genoa, Italy). *Digestion* 14(2):184-187; 1976.

0944 DIRECT EFFECTS OF ^{13}-NORLEUCINE-MOTILIN ON THE ELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED PERFUSED CANINE STOMACH AND DUODENUM [Abstract]. (Eng.) Green, W. E. R.; Ruppin, H.; Wingate, D. L.; Wunsch, E. (London Hosp., Medical Coll., London, E1 2AD, England). *J. Physiol.* 256(1):48P-49P; 1976.

0945 ACTIONS OF SYNTHETIC PORCINE MOTILIN, OCTAPEPTIDE OF CHOLECYSTOKININ (CCK), GASTRIC INHIBITORY POLYPEPTIDE (GIP) AND SECRETIN ON MYOELECTRICAL ACTIVITY OF GASTRIC ANTRUM AND DUODENUM [Abstract]. (Eng.) Castresana, M.; Lee, K. Y.; Chey, W. Y. (Genesee Hosp., Rochester, NY 14607). *Fed. Proc.* 35(3):61; 1976.

See also, 0859, 1137, 1143, 1148, 1184, 1187, 1260, 1263, 1264.

0946 EFFECT OF CARBENOXOLONE ON ELECTROLYTE OUTPUT OF SALIVARY GLANDS DURING NASOGASTRIC INTUBATION. (Eng.) Ivey, K. J. (Univ. Missouri Medical Center, Columbia, MO 65201). *Am. J. Dig. Dis.* 21(12):1033-1036; 1976.

The effect of carbenoxolone on the output of salivary electrolytes stimulated by a nasogastric tube was studied in four healthy volunteers. Mean values for volume and electrolyte concentrations in control studies were: volume, 121 ± 19 ml/hr; pH, 7.39; Na^+, 19 ± 5; K^+, 20 ± 1; Cl^-, 20 ± 3; HCO_3^-, 18 mEq/l; and osmolality, 71 ± 8 mOsm/kg. Mean electrolyte outputs were quite large; Na^+, 2.4; K^+, 2.4; Cl^-, 2.6; and bicarbonate, 2.2 mEq/hr. The control data indicated that in the course of gastric secretory testing, the indwelling gastric tube stimulates a salivary electrolyte output sufficient to interfere with accurate assessment of gastric ionic fluxes and gastric acid analysis. Therapeutic doses of carbenoxolone (100 mg, t.i.d.) given p.o. for 3 weeks had no effect on salivary volume, electrolyte output, or concentration. It is concluded that carbenoxolone has no mineralocorticoid effect on mixed salivary secretion. Attention to salivary secretion is recommended in all gastric secretory studies and is mandatory where low acid output is suspected.

0947 ENDOGENOUS GASTRIC INHIBITORY POLYPEPTIDE (GIP) RELEASE AND ACID SECRETION (AS) [Abstract]. (Eng.) O'Dorisio, T. M.; Martin, E. W., Jr.; Thomford, N. R.; Mazzaferri, E. L.; Cataland, S. (Dept. Medicine, Surgery, Ohio State Univ., Columbus, OH). *Clin. Res.* 24(3):289A; 1976.

0948 THE ABILITY OF THE CALCIUM IONOPHORE A-23187 TO MIMIC SOME OF THE EFFECTS OF ADRENALINE ON THE METABOLISM OF RAT SUBMAXILLARY GLAND. (Eng.) Thompson, M. P.; Williamson, D. H. (Dept. Biochemistry, Univ. Otago, P.O. Box 56, Dunedin, New Zealand). *FEBS Lett.* 62(2):208-211; 1976.

See also, 0891, 0903, 1113, 1661.

SECRETION AND METABOLISM

Stomach

0949 IONIC PATHWAYS OF SECRETORY MEMBRANE OF FROG GASTRIC MUCOSA IN Cl^--FREE MEDIA. (Eng.) Holloman, T. L.; Schwartz, M.; Dinno, M. A.; Carrasquer, G. (Dept. Applied Mathematics, Univ. Louisville, Louisville, KY 40208). *Am. J. Physiol.* 231(6):1649-1654; 1976.

The return ionic pathways of the secretory membrane of frog gastric mucosa associated with the electrogenic H^+ pump were studied in Cl^--free media. The replacement of a 52 mM Na_2SO_4 secretory solution with a 52 mM K_2SO_4 secretory solution led to a decrease of resistance, an increase of the H^+ secretory rate, and a reversal of the potential difference. The replacement of 52 mM Na_2SO_4 with 52 mM $MgSO_4$ led to an increase in resistance and a decrease in the H^+ rate. These results provide evidence for the existence of K^+ and Na^+ pathways, the former having a lower resistance than the latter. By short-circuiting the mucosa in Mg^{2+} solutions, the H^+ rate increased to that in Na^+ solutions, ruling out the possibility that Mg^{2+} might interfere with the H^+ pump. The fact that the Mg^{2+} secretory solution, without K^+ or Na^+ did not abolish the H^+ rate suggests the presence of at least a third ionic pathway, presumably SO_4^{2-}, providing that Mg^{2+} does not penetrate the mucosa.

0950 INFLUENCE OF CHANGES OF BLOOD CALCIUM LEVEL ON BASAL GASTRIC SECRETION. (Cze.) Blahos, J.; Mertl, L.; Gregor, O.; Kotas, J (I. Vnitrni Klinika FDL, Vlasska 36, 118 33 Praha 1, Czechoslovakia). *Vnitr. Lek.* 21(5):440-445; 1975.

EDTA infusion in 11 healthy adults caused a marked decrease in the blood calcium level, accompanied by a statistically significant reduction in gastric free HCl and total acidity, in comparison with basa levels. After infusion was stopped and the calcium level began to rise again, increases in free HCl and total acidity (statistically significant) were observed. Since the decrease in the blood calcium level was induced by EDTA rather than parathyroidectomy, the decreases in gastric secretion must have been the result of the blood calcium reductio alone, and the possible influence of a reduction in the parathyroid hormone level can be excluded. Rapid calcium infusion in 10 subjects resulted in a marked increase in the blood calcium level, whic was accompanied by a statistically significant increase in gastric free HCl and total acidity in comparison with basal values. When the blood calci level decreased after the calcium infusion was stopped, gastric secretion also decreased. Althoug the mechanism of the effect of blood calcium levels on gastric secretion is not known, a brief review of the literature indicates the possible effect of calcium on vagal activity, gastrin secretion, and cellular and membrane processes of parietal cells.

0951 SC-29333: A POTENT INHIBITOR OF CANINE GASTRIC SECRETION.

(Eng.) Dajani, E. Z.; Driskill, D. R.; Bianchi, R. G.; Collins, P. W.; Pappo, R. (Dept. Biological Res., Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Am. J. Dig. Dis.* 21(12):1049-1057; 1976.

The gastric antisecretory effects of SC-29333, a novel prostaglandin E_1 (PGE_1) analog, were compared to the reference standard PGE_1 methyl ester (PGE_1ME) in gastric fistula and Heidenhain pouch dogs. Secretion was stimulated submaximally by the continuous i.v. infusion of either histamine (1.0 mg/hr) or pentagastrin (4.0 µg/kg/hr). Meal-stimulated gastric secretory studies were also conducted. SC-29333 effectively inhibited volume, acid output, and pepsin secretion, in a dose-dependent manner. When administered i.v., SC-29333 was found to be approximately 30 times more potent than PGE_1ME. The ranges of active i.v. bolus doses for SC-29333 and PGE_1ME were 0.3-3.0 and 10-30 µg/kg, resp. Unlike PGE_1ME, SC-29333 was effective p.o. at doses of 10-30 µg/kg and was considerably better tolerated and longer acting than PGE_1ME at active antisecretory doses. It is concluded that SC-29333 is a potent, long-acting, orally effective inhibitor of gastric secretion in the dog.

0952 EFFECTS OF IN VIVO ADMINISTRATION OF PENTAGASTRIN, SECRETIN, AND 13-Nle-MOTILIN ON THE IN VITRO INCORPORATION OF ^{14}C-LEUCINE INTO PROTEIN OF HUMAN GASTRIC MUCOSA.

(Eng.) Mitznegg, P.; Domschke, W.; Domschke, S.; Belohlavek, D.; Sprugel, W.; Strunz, U.; *et al.* (Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-852 Erlangen, W. Germany). *Scand. J. Gastroenterol.* 11(7):657-660; 1976.

The effects of pentagastrin, synthetic secretin, and 13-norleucine motilin (13-nle-motilin) on protein synthesis were studied in human gastric mucosa; the effects of pentagastrin on protein synthesis in the duodenal mucosa were also studied. Under endoscopic control, biopsy specimens were taken from the oxyntic gland area of the stomach before and after the administration of the respective drugs. In 29 volunteers without upper gastrointestinal disease, the basal rate of [^{14}C]leucine ncorporation into mucosal protein averaged 1.2 ± 7.7 x 10^3 counts per min/mg protein. ne and four hr after the s.c. administration f pentagastrin (6 µg/kg), values were significantly ncreased ($p<0.05$) by 18.9 and 21.8%, resp., over he basal level. One hour after an i.v. injection f secretin (2 clinical U/kg), gastric mucosal rotein synthesis was not substantially inhibited, hereas a 1-hr continuous i.v. infusion of 13-nle-otilin (0.4 µg/kg/hr) significantly decreased [^{14}C]leucine incorporation rates by 17.5% ($p<0.05$). One hour after the s.c. administration of pentagastrin, protein synthesis in human duodenal mucosa was not altered, which differs from the response previously reported in the rat. The results indicate that pentagastrin has a trophic influence on gastric mucosa in man. Gastrin and motilin may be involved in the regulation of human gastrin mucosal protein synthesis.

0953 EFFECT OF SECRETIN, GLUCAGON AND DUODENAL ACIDIFICATION ON BOMBESIN-INDUCED HYPERGASTRINEMIA IN MAN.

(Eng.) Basso, N.; Giri, S.; Lezoche, E.; Materia, A.; Melchiorri, P.; Speranza, V. (Istituto II Pathol. Chir., Policlinico Umberto I, Universita' di Roma, 00161 Rome, Italy). *Am. J. Gastroenterol.* 66(5):448-451; 1976.

The effects of duodenal acidification and of continuous infusion or a single i.v. bolus injection of secretin or glucagon were studied in 18 healthy subjects with bombesin (BBS)-induced hypergastrinemia. The subjects received BBS (15 ng/kg/min, i.v.) over a 90-min period. The continuous infusion of secretin (1.7 U/kg/hr) or glucagon (50 ng/kg/min) during the last 45 min of the BBS infusion did not significantly alter the BBS-stimulated serum gastrin levels (mean levels, 165 and 210 pg/ml in 6 subjects that subsequently received glucagon and 6 that received secretin, resp.). The same was true when the duodenum was acidified by the infusion of 0.1 N HCl (5 ml/min) in the six remaining subjects. The bolus injection of glucagon (1 mg) significantly decreased the mean serum gastrin level from a peak level of 190 pg/ml after bombesin administration to 90 pg/ml. The bolus injection of secretin (1.7 U/kg) significantly decreased the mean serum gastrin level from 180 pg/ml to the pre-bombesin level of 90 pg/ml. The fact that BBS-stimulated gastrin secretion is not inhibited by the continuous infusion of glucagon or secretin may support the hypothesis that BBS is not physiologically present in the digestive system.

0954 THE IMPORTANCE OF PAPS IN DETERMINING SULFATION IN GASTROINTESTINAL MUCOSA.

(Eng.) Liau, Y. H.; Horowitz, M. I. (New York Medical Coll., Valhalla, NY 10595). *Digestion* 14(4): 372-375; 1976.

0955 PHYSIOLOGICAL PARAMETERS OF THE GASTRIC MUCOSAL BARRIER.

(Eng.) Davenport, H. W. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Am. J. Dig. Dis.* 21(2):141-143; 1976.

0956 SIGNIFICANCE OF THE ANTRUM IN HUMAN GASTRIC ACID SECRETION [Abstract].

(Eng.) Bergegardh, S.; Olbe, L. (Sahlgren's Hosp., Goteborg, Sweden). *Acta Hepatogastroenterol. (Stuttg.)* 23(1): 75; 1976.

0957 CURRENT VIEW ON THE PHYSIOLOGY AND PATHOPHYSIOLOGY OF GASTRIC ACID SECRETION.

(Eng.) Emas, S. (Karolinska Hosp., Stockholm, Sweden). *Acta Hepatogastroenterol. (Stuttg.)* 22(6): 411-414; 1975.

0958 THE ISOLATION AND CHARACTERIZATION OF GASTRIC ACID INHIBITORY SUBSTANCES FROM SIMIAN CHRONIC ANACID AND POST ELECTROANESTHESIA GASTRIC JUICE [Abstract]. (Eng.) Armstrong, R. N. (No affiliation given). *Diss. Abstr. Int.* [*B*] 37(2): 731B; 1976.

0959 RELATIONSHIPS BETWEEN GASTRIC AND PANCREATIC SECRETIONS AFTER A MEAL [Abstract]. (Eng.) Verine, H. J. (Veterans Admin. Center, Los Angeles, CA 90073). *Biol. Gastroenterol. (Paris)* 9(1):71; 1976.

0960 STUDIES ON THE IMPORTANCE OF CEPHALIC-VAGAL STIMULATION IN THE ACID SECRETORY RESPONSE TO FOOD IN NORMAL HUMAN SUBJECTS [Abstract]. (Eng.) Richardson, C. T.; Feldman, M.; Walsh, J. H. (Univ. Texas Health Science Center, Dallas, TX). *Clin. Res.* 25(3):469A; 1977.

0961 THE ROLE OF GASTRIN IN THE ACID RESPONSE OF HEIDENHAIN POUCHES TO FOOD IN DOGS [Abstract]. (Eng.) Keuppens, F.; Bremen, J.; Woussen-Colle, M. C.; De Graef, J. (Lab. Experimental Surgery, Free Univ. Brussels, Brussels, Belgium). *Digestion* 13(3):175; 1975.

0962 INHIBITORY EFFECT OF AN INTRAVENOUS GLUCOSE LOAD ON BASAL AND INSULIN-STIMULATED GASTRIC ACID SECRETION IN MAN. (Eng.) Stacher, G.; Bauer, P.; Starker, H.; Schulze, D. (Psychophysiologisches Laboratorium, 1. Chirurgische Universitatsklinik, Alserstrasse 4, A-1097 Vienna, Austria). *Int. J. Clin. Pharmacol. Biopharm.* 13(2):107-112; 1976.

0963 EFFECT OF X-IRRADIATION ON VITAMIN B_{12} BINDING CAPACITY TO INTRINSIC FACTOR. (Eng.) D'Souza, D. W.; Vakil, U. K.; Sreenivasan, A. (Biochemistry and Food Technology Div., Bhabha Atomic Res. Centre, Bombay, India). *Environ. Physiol. Biochem.* 5:217-225; 1975.

0964 THE EFFECT OF CARBACHOL AND PENTAGASTRIN ON THE GASTRIC SECRETION OF ACID, PEPSIN AND INTRINSIC FACTOR (IF) IN MAN [Abstract]. (Eng.) Vatn, M. H.; Schrumpf, E.; Myren, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(34):45-46; 1975.

0965 INDOMETHACIN, PENTAGASTRIN AND GASTRIC ARTERIAL BLOOD FLOW [Abstract]. (Eng.) Flexner, C.; Gerkins, J. F.; Oates, J. A.; Shand, D. G. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Clin. Res.* 24(1):8A; 1976.

0966 THE ROLE OF PROSTAGLANDINS IN GASTRIC ACID SECRETION [Abstract]. (Eng.) Main, I. H. M.; Whittle, B. J. R. (Sch. Pharmacy, Univ. London, London, England). *Digestion* 13(1/2):117-118; 1975.

0967 PROSTAGLANDIN E_2, ADENYLATE CYCLASE AND CANINE GASTRIC SECRETIONS [Abstract]. (Eng.) Dozois, R. R.; Wollin, A. (Dept. Surgery and Physiology, Mayo Clinic, Rochester, MN). *Digestion* 13(3):167-168; 1975.

0968 OXYGEN CONSUMPTION DURING 16,16 DIMETHYL PROSTAGLANDIN E_2 INHIBITION OF ACID SECRETION IN DOGS [Abstract]. (Eng.) Cheung, L.; Chang, N. (Dept. Surgery, Univ. Utah, Salt Lake City, UT). *Clin. Res.* 25(2):109A; 1977.

0969 ENDOGENOUS GASTRIC INHIBITORY POLYPEPTIDE (GIP) RELEASE AND ACID SECRETION (AS) [Abstract]. (Eng.) O'Dorisio, T. M.; Martin, E. W. Jr.; Thomford, N. R.; Mazzaferri, E. L.; Cataland, S (Dept. Medicine and Surgery, Ohio State Univ., Columbus, OH). *Clin. Res.* 23(4):483A; 1975.

0970 EFFECTS OF SOUND STIMULUS ON GASTRIC SECRETION AND PLASMA CORTICOSTERONE LEVEL IN RATS. (Eng.) Guha, D.; Williams, E. F.; Nimitkitpaisan, Y.; Bose, S.; Dutta, S. N.; Pradhan, S. N. (Howard Univ. Coll. Medicine, Washington, DC 20059) *Res. Commun. Chem. Pathol. Pharmacol.* 13(2):273-281 1976.

0971 GASTRIN RELEASE BY BOMBESIN FROM CANINE ANTRAL MUCOSA IN VITRO [Abstract]. (Eng. Weiss, B. A.; Strunz, U. T.; Walsh, J. H. (Veterans Admin. Hosp., Los Angeles, CA). *Clin. Res.* 25(2): 113A; 1977.

0972 A SIMPLIFIED METHOD FOR CHEMICAL INDUCTIO OF GASTRIC HYPERSECRETION. (Eng.) Weeks J. B.; Petridis, G. C.; Woodward, E. R.; Dragstedt, L. R. (Coll. Medicine, Univ. Florida, Gainesville, FL 32610). *J. Surg. Res.* 21(5):357-358; 1976.

0973 HISTAMINE CONTENT IN HUMAN GASTRIC MUCOS ITS RELATION TO THE PENTAGASTRIN-STIMULA ACID SECRETION AND TO SELECTIVE-GASTRIC VAGOTOMY WITH DRAINAGE. (Eng.) Troidl, H.; Lorenz, W.; Rohde, H.; Hafner, G.; Ronzheimer, M.; Schmal, A. (Surgery Clinic, Univ. Marburg a.d. Lahn, W. Germa *Agents Actions* 5(5):427-428; 1975.

0974 THE EFFECT OF THE HISTAMINE H_2-RECEPTOR CANINE GASTRIC MUCOSAL BARRIER [Abstract (Eng.) Kenyon, G.; Carter, D. C. (Edinburgh Univ. Medical Sch., Edinburgh, Scotland). *Gut* 17(5):388 1976.

0975 ROLE OF HISTAMINE RECEPTORS IN THE PATHOPHYSIOLOGY OF GASTRIC MUCOSAL DAMAGE [Abstract]. (Eng.) Rees, W. D. W.; Rhodes, J.; Wheeler, M. H.; Meek, M. E.; Newcombe, R. G. (Univ. Hosp. of Wales, Cardiff, Wales). *Gut* 17(5):388; 1976.

0976 A REVIEW: THE AGENTS AND ACTIONS OF SYMPATHETIC NERVE AND CATECHOLAMINE INHIBITION OF GASTRIC MUCOSAL FUNCTION. (Eng.) Sanders, D. J. (Medical Sch., Newcastle upon Tyne, NE1 7RU, England). *Agents Actions* 6(4):385-388; 1976.

0977 ACUTE EROSIVE GASTRITIS INDUCED BY D-PENICILLAMINE: ITS PREVENTION BY MYLANTA II, METIAMIDE AND CIMETIDINE [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Clin. Res.* 25(3):314A; 1977.

0978 ACUTE GASTRIC ULCER FORMATION IN RESPONSE TO ELECTRICAL VAGAL STIMULATION IN RATS. (Eng.) Cho, C. H.; Ogle, C. W.; Dai, S. (Faculty Medicine, Univ. Hong Kong, Hong Kong). *Eur. J. Pharmacol.* 35(1):215-219; 1976.

0979 A SYNERGISTIC INTERACTION BETWEEN ASPIRIN, OR OTHER NON-STEROIDAL ANTI-INFLAMMATORY DRUGS, AND STRESS WHICH PRODUCES SEVERE GASTRIC MUCOSAL DAMAGE IN RATS AND PIGS. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., G.P.O. Box 252c, Hobart, Tasmania, Australia, 7001). *Agents Actions* 5(5):553-558; 1975.

0980 THE EFFECT OF METIAMIDE ON GASTRIC MUCOSAL INJURY IN RAT RESTRAINT [Abstract]. (Eng.) Zinner, M. J.; Turtinen, L.; Gurll, N.; Reynolds, D. G. (Walter Reed Army Inst. Res., Washington, DC). *Clin. Res.* 23(4):484A; 1975.

See also, 0998, 1089, 1140, 1144, 1145, 1341.

SECRETION AND METABOLISM

Pancreas

981 EFFECTS OF EXOCRINE AND ENDOCRINE RAT PANCREAS OF LONG-TERM ADMINISTRATION OF CK-PZ (CHOLECYSTOKININ-PANCREOZYMIN) OR SYNTHETIC CTAPEPTIDE-CCK-PZ. (Eng.) Ihse, I.; Arnesjo, B.; undquist, I. (Dept. Surgery, Univ. Lund, Lund, weden). *Scand. J. Gastroenterol.* 11(5):529-535; 976.

he effects of repeated s.c. injections of equivalent oses (2 Ivy dog units) of commercial (10% pure) choleystokinin-pancreozymin (CCK-PZ) and of the synthetic -terminal octapeptide of CCK-PZ on exocrine and endorine rat pancreas were studied. Male Wistar rats ere treated with one of the hormones for 10 days. ats treated with the commercial CCK-PZ and with the ctapeptide had an increased wet weight of the panreas. Pancreatic concentrations of amylase, lipase, nd trypsinogen increased in a parallel fashion after oth kinds of hormonal treatment. Rats treated with he commercial CCK-PZ preparation displayed a lower nsulin response following an i.v. glucose load. The lucose tolerance, however, was slightly improved. he octapeptide treatment induced no alterations of he insulin or glucose levels after similar glucose oads. The insulin content and the concentration of rotein in pancreatic tissue or glycogen in liver nd muscle tissue were unaffected by both treatments.) difference was found on glucose utilization in uscle tissue *in vitro*. It is concluded that equiotent doses of the synthetic octapeptide and the 10% pure CCK-PZ preparation induce a similar and parallel increase of the concentrations of all three exocrine pancreatic enzymes. The inhibitory effect on glucose-induced insulin release exerted by the 10-day treatment with commercial CCK-PZ, but not by the octapeptide, is conceivably due to peptide impurities in the commercial CCK-PZ and/or to parts of the CCK-PZ molecule other than the C-terminal octapeptide.

0982 EFFECT OF NICOTINE ON SERUM SECRETIN AND EXOCRINE PANCREATIC SECRETION. (Eng.) Boden, G.; Shore, L. S.; Essa-Koumar, N.; Landor, J. H. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Am. J. Dig. Dis.* 21(11):974-977; 1976.

Because of reports that nicotine markedly depresses exocrine pancreatic responses to exogenous secretin and to intestinal acidification, the effect of nicotine (100 μg/kg/hr) on serum secretin and pancreatic secretions was studied in dogs with chronic pancreatic fistulas. The release of immunoreactive secretin (IRS) was stimulated by the intraduodenal infusion of HCl (9.6 mEq/30 min). Pancreatic flow rate and bicarbonate and protein secretions were stimulated either by intestinal acidification or infusion of exogenous secretin (1.0 IU/kg/hr). Nicotine delayed the appearance of peak IRS concentrations in response to intraduodenal HCl by about 20 min; however, it had no effect on the total amount of IRS released, nor was this delay accompanied by a similar delay in the appearance of peak bicarbonate output. Furthermore, nicotine did not affect pancreatic secretory function stimulated by either HCl or exogenous secretin. These data do not support the hypothesis that nicotine plays an important role in the pathogenesis of duodenal ulcers in smokers by inhibiting the pancreatic secretion of bicarbonate.

0983 EFFECT OF IRRADIATION ON THE CANINE EXOCRINE PANCREAS. (Eng.) Pieroni, P. L.; Rudick, J.; Alder, M.; Nacchiero, M.; Rybak, B. J.; Perlberg, H. J., Jr.; Dreiling, D. A. (Mount Sinai Sch. Medicine, City Univ. New York, 5th Ave. and 100th St., New York, NY 10029). *Ann. Surg.* 184(5):610-614; 1976.

The short- and long-term effects of irradiation on the pancreas were studied in six dogs receiving a dose equivalent to that given to patients with Hodgkin's disease (4,000 R/6 weeks; nominal standard dose, 1,175 rets). After control secretory, histologic, and pancreatographic studies, six Thomas fistula dogs were subjected to a 2,400-R tumor dose over 2 weeks. There was a biphasic response to secretin alone or secretin with cholecystokinin-pancreozymin. An initial hypersecretion occurred at 2 weeks; the volume was increased, but bicarbonate and enzyme output remained unchanged. Thereafter there was a progressive reduction in volume, bicarbonate, and enzyme outputs (>90% after 3 months). Early ductal reduplication, but with progressive fibrosis, was detected, features compatible with chronic pancreatitis. Pancreatic insufficiency may contribute to postirradiation gastrointestinal symptoms. Close field irradiation of the pancreas results in actual destruction of the parenchyma.

0984 STUDY OF PURE HUMAN PANCREATIC SECRETION. COMPARISON OF THE RESULTS OBTAINED BY PERFUSION AND AFTER A BOLUS INJECTION OF SECRETIN [Abstract]. (Eng.) Cremer, M.; Jacobs, W.; Deltenre, M. (Brugmann Univ. Hosp., Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9(1):83-84; 1976.

0985 A DEMONSTRATION THAT THE RATIOS BETWEEN HUMAN PANCREATIC ENZYMES CAN CHANGE IN FOUR DAYS [Abstract]. (Eng.) Allan, B. J.; White, T. T. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Biol. Gastroenterol. (Paris)* 9(1):60; 1976.

0986 BICARBONATE AND CYCLIC AMP SECRETION IN PURE PANCREATIC JUICE: DOSE-RESPONSE CURVES TO SYNTHETIC SECRETIN IN MAN [Abstract]. (Eng.) Domschke, S.; Domschke, W.; Rosch, W.; Konturek, S.; Wunsch, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, D-852 Erlangen, W. Germany). *Gut* 16(10):837; 1975.

0987 ABOUT THE SITE OF ACTION OF THE DIBUTYRYL DERIVATIVE OF 3'5' CYCLIC ADENOSINE MONOPHOSPHATE IN THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Eng.) Bauduin, H.; Stock, C.; Vincent, D.; Potvliege, P. (Free Univ. Brussels, Sch. Medicine, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9(1):80; 1976.

0988 COMPREHENSIVE FORMAL MODELS FOR PANCREATIC CALCIUM SECRETION: WITH REFERENCE TO "EXCHANGE-DIFFUSION," "TWO-COMPONENT," AND "UNICELLULAR" MODELS OF ELECTROLYTE SECRETION. (Eng.) Moore, E. W. (Box 908, MCV Station, Medical Coll. Virginia, Richmond, VA 23298). *Am. J. Dig. Dis.* 21(9):766-775; 1976.

0989 EFFECTS OF PARENTERAL HYPERALIMENTATION ON PANCREATIC AND BILIARY SECRETION [Abstract]. (Eng.) Adler, M.; Pieroni, P. L.; Takeshima, T.; Nacchiero, M.; Dreiling, D. A.; Rudick, J. (Mount Sinai Sch. Medicine, City Univ., New York, NY). *Surg. Forum* 26:445-446; 1975.

0990 INTERACTION OF HORMONE EFFECTS ON RAT PANCREAS ADENYLATE CYCLASE. (Eng.) Kempen, H. J.; du Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Biol. Gastroenterol.* 8(4):359; 1975.

0991 SPECIFIC HORMONAL REGULATION, BY FOOD, OF THE PANCREAS ENZYMATIC (AMYLASE, LIPASE AND TRYPSIN) SECRETIONS [Abstract]. (Eng.) Dick, J.; Felber, J. P. (Hopital Cantonal Universitaire, 1011 Lausanne, Switzerland). *Biol. Gastroenterol. (Paris)* 9(1):58-59; 1976.

0992 ELECTROLYTE SECRETION OF A PANCREATIC DUCT MODEL IN THE RAT IN VIVO AND ACCUMULATION OF CYCLIC ADENOSINE 3':5' MONOPHOSPHATE IN VITRO IN RESPONSE TO GASTROINTESTINAL HORMONES [Abstract]. (Eng.) Folsch, U. R.; Ebert, R.; Creutzfeldt, W. (Division Gastroenterology Metabolism Univ. Gottingen, Gottingen, W. Germany). *Biol. Gastroenterol. (Paris)* 9(1):69-70; 1976.

0993 THE EFFECT OF ACETALDEHYDE ON THE TOTALLY ISOLATED CANINE PANCREAS. (Eng.) Fitzpatrick, J.; Fitzgerald, O.; Fitzgerald, P.; McGeeney K. F. (Dept. Surgery, Univ. Coll., Dublin 4, Ireland). *Biol. Gastroenterol. (Paris)* 8(4):363; 1975.

0994 EXTERNAL PANCREATIC SECRETION AFTER BOMBESIN INFUSION IN MAN [Abstract]. (Eng.) Basso, N.; Lezoche, E.; Percoco, M.; Materia, A.; Speranza, V. (Istituto di Patologia Speciale Chirurgica III dell'Universita, Roma, Italy). *Rend. Gastroenterol.* 7(3):243-244; 1975.

0995 THE EFFECT OF ATROPINE AND MAGNESIUM ON HUMAN PANCREATIC ENZYME SECRETION STIMULA-

TED BY INDUCED HYPERCALCEMIA. (Eng.) Hotz, J.; Goebell, H.; Ziegler, R. (Center Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Biol. Gastroenterol. (Paris)* 8(4):356-357; 1975.

0996 EFFECTS OF CHOLECYSTOKININ, SECRETIN AND ACETYLCHOLINE ON PANCREATIC ENZYME SECRETION AND TISSUE LEVELS OF CYCLIC GMP AND CYCLIC AMP [Abstract]. (Eng.) Albano, J.; Bhoola, K. D.; Harvey, R. F. (Univ. Dept. Medicine Pharmacology, Bristol, England). *Biol. Gastroenterol. (Paris)* 9(1):78-79; 1976.

0997 RAT PANCREATIC RNA POLYMERASES STIMULATION BY FEEDING OR CHOLECYSTOKININ-PANCREOZYMIN + SECRETIN: RELATIONSHIP WITH PROTEIN SYNTHESIS [Abstract]. (Eng.) Rajotte, D.; Dagorn, J. C.; Morisset, J. (G. I. Res. Unit, Sherbrooke Univ., Sherbrooke, P.Q., Canada). *Biol. Gastroenterol. (Paris)* 9(1):79; 1976.

0998 STRUCTURE-ACTIVITY RELATIONS OF SECRETIN: BIOLOGICAL EFFECTIVENESS OF C-TERMINAL SEQUENCES [Abstract]. (Eng.) Schebalin, M.; Fink, M. L.; Bodanszky, M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Clin. Res.* 24(3):290A; 1976.

0999 IDENTIFICATION OF TWO DISTINCT CHOLECYSTOKININ RECEPTORS IN PANCREATIC ACINAR CELLS [Abstract]. (Eng.) Long, B. W.; Gardner, J. D. (Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 24(3):287A; 1976.

1000 PROTON NMR STUDIES OF THE AROMATIC RESIDUES IN THE BASIC PANCREATIC TRYPSIN INHIBITOR (BPTI). (Eng.) Wagner, G.; Wuthrich, K. (Eidgenossische Technische Hochschule, Zurich-Honggerberg, 8049 Zurich, Switzerland). *J. Magn. Reson.* 20(3):435-445; 1975.

1001 CONVOLUTION DIFFERENCE ^{1}H NMR SPECTRA AT 360 MHz OF THE BASIC PANCREATIC TRYPSIN INHIBITOR. (Eng.) Wagner, G.; De Marco, A.; Wuthrich, K. (Eidgenossische Technische Hochschule, Zurich-Honggerberg, 8049 Zurich, Switzerland). *J. Magn. Reson.* 20(3):565-569; 1975.

1002 THE SPECIFIC BINDING OF RADIOIODINATED VASOACTIVE INTESTINAL OCTACOSAPEPTIDE (VIP) ON ISOLATED PANCREATIC ACINAR CELLS FROM THE GUINEA PIG [Abstract]. (Eng.) Christophe, J.; Conlon, T. P.; Gardner, J. D. (Faculte de Medecine, Universite Libre de Bruxelles, Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 83(5):950-951; 1975.

See also, 0894, 0959, 1079, 1336, 1337.

SECRETION AND METABOLISM

Hepatobiliary Tract

003 HEPATIC BILE FORMATION (FIRST OF TWO PARTS). (Eng.) Javitt, N. B. (New York Hosp.-ornell Medical Center, 525 E. 68th St., New York, NY 10021). *N. Engl. J. Med.* 295(26):1464-1479; 1976.

he generation of bile water flow and the hepatic ransport of bile acids, bilirubin, and related organic anions (from miscellaneous compounds in the aily diet or medications) are reviewed. The microirculatory hepatic unit that has functional importance ithin the liver acinus is illustrated, and its opertion is described. The central problem of bile formation is understanding the mechanisms that generate ulk movement of water into the bile canaliculi. ata suggest that water flow occurs in response to smotic gradients. Studies of water flow in the ephron show that mannitol, which is distributed in liver-cell water, reflects glomerular filtration accurately. Estimation of the mannitol output in urine, compared to the plasma concentration, indicates total water flow across the glomerular membrane, and the urine-to-plasma ratio indicates the fraction of water reabsorbed distal to the glomerulus. The presence of mannitol in liver-cell water has been postulated as a result of entry via pores, via a specialized transport system in the membrane, or via regulation by the cytoplasmic water structure. Because of the excellent correlation between bile acid excretion and canalicular bile flow in all species, the term bile-acid-dependent canalicular bile flow was coined to describe this relation. This flow is demonstrable only at high rates of bile acid output, and its physiological basis is assumed to be related to the osmotic properties of the bile acids. A detailed analysis of the flow is given.

1004 HEPATIC BILE FORMATION (SECOND OF TWO PARTS). (Eng.) Javitt, N. B. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *N. Engl. J. Med.* 295(27):1511-1516; 1976.

Hepatic bile formation and possible disturbances in the generation of bile flow at the molecular level are reviewed. A model of hepatic bile formation is described in which hepatocytes along a sinusoid successively extract bile acid until there is virtually none left in plasma. The load of the bile acids determines the number of participating hepatocytes, and the volume of bile generated determines the excretion rate of other organic solutes that are transported into the canaliculus by independent mechanisms. Failure of bile acid transport shuts this system down. The bile acid transport system can be sodium linked and is thus regulated by agents affecting either sodium or the obligated bile acid anions. Four categories of bile flow disturbance at the molecular level can be envisioned. One category involves genetic or acquired defects in the synthesis of carrier molecules. The second relates to energy sources needed to maintain mobile carrier activity, such as the sodium-potassium exchange pump requiring ATP and appropriate hydrolase enzymes. The third category involves changes in the permeability properties of the canaliculi and proximal ductules that normally restrict diffusion of molecules that are actively secreted. A fourth category involves metabolic alterations in bile acid synthesis affecting the generation of canalicular bile flow. Experimentally, monohydroxy bile acids such as 3α-hydroxy-5-β cholanoic acid and 3β-hydroxy-5-cholenoic acid can induce a severe cholestasis. The pathogenesis of the cholestasis is related to the insolubility of the compounds in aqueous solution, and their cholestatic effect is preventable by the simultaneous infusion of chenodeoxycholic or cholic acids.

1005 THE ROLE OF THE DIGESTIVE TRACT IN CHOLESTEROL METABOLISM. (Eng.) Lutton, C. (Laboratoire de Physiologie de la Nutrition, Batiment 447, F-91405 Orsay, France). *Digestion* 14(4): 342-356; 1976.

Recent developments in the intestinal secretion, excretion, and absorption of cholesterol (Ch) are reviewed, with emphasis on the role of the digestive tract in these functions in rats. Discrepancies between rat and man are pointed out. Feces from rats fed a diet with Ch (0.015%) as the only sterol, contain 0.5 mg/day of unabsorbed dietary Ch, 3 mg excreted fecal Ch, and 3 mg Ch synthesized by the digestive tract and secreted into the lumen. The mechanisms by which endogenous Ch (excreted and secreted) enters the small intestine are not yet clear, but several theories are presented. In man, endogenous Ch excretion is due solely to excreted fecal Ch, with no contribution from externally secreted fecal Ch. Sterols are transformed more extensively by human flora than by rat flora. Three sources of Ch are available for absorption in rats: dietary, excreted, and secreted Ch. Because of partial mixing, there could be a different Ch absorption coefficient for each source. The migration of Ch across the cell and mechanisms associated with the transfer of Ch to lymph are explored. What is known about the regulation of fecal excretion, external secretion, absorption, and synthesis of Ch is summarized. In man, the rate of Ch excretion is quantitatively as large as bile acid production, and conversion of Ch into bile acids does not seem to be affected by large amounts of Ch in the diet. New methods such as isotopic equilibrium, which measures Ch turnover rates in intact animals simultaneously, are promising, but it is not yet clear whether the mechanisms regulating Ch turnover in man are similar to those in the rat.

1006 ENZYMATIC SULFATION OF BILE SALTS. PARTIAL PURIFICATION AND CHARACTERIZATION OF AN ENZYME FROM RAT LIVER THAT CATALYZES THE SULFATION OF BILE SALTS. (Eng.) Chen, L. J.; Bolt, R. J.; Admirand, W. H. (Sch. Medicine, Univ. California, Davis, CA 94143). *Biochim. Biophys. Acta* 480(1):219-227; 1977.

An enzyme system that catalyzes the transfer of the sulfate group from 3'-phosphoadenosine-5'-phosphosulfate to bile salts was identified and characterized from rat liver. The enzyme is present in the cytosol fraction of liver cells. The apparent K_m values of the enzyme for 3'-phosphoadenosine-5'-phosphosulfate and taurolithocholate were 8×10^{-6} M and 5×10^{-5} M, resp. Enzyme activity was highest in the liver (37 U/mg protein), but was also detected in the kidney (18 U/mg). Enzyme activity was not detectable in brain, heart, spleen, intestinal mucosa, or RBC. The activity was completely inhibited by *p*-chloromercuribenzoate (1 mM), indicating that the enzyme requires a sulfhydryl group for activity. Rates of sulfation (compared to taurolithocholate as 1.0) were 1.2 with glycolithocholate and 0.27 with lithocholate. Sulfation appears to occur with both conjugated and unconjugated bile salts; however, the rate of sulfation is higher with the former than with the latter. A molecular weight of 130,000 was estimated by gel filtration, and the enzyme showed an isoelectric point of 5.3.

1007 CHOLIC ACID UPTAKE INTO ISOLATED RAT HEPATOCYTES. (Eng.) Anwer, M. S.; Kroker, R.; Hegner, D. (Institut fur Pharmakologie, Toxikologie und Pharmazie, Fachbereich Tiermedizin der Universitat Munchen, Veterinarstr. 13, D-8000 Munich 22, W. Germany). *Scand J. Clin. Lab. Invest.* 36(5):1477-1486: 1976.

To further characterize the process of hepatic uptake of unconjugated bile acid, cholic acid uptake was studied in isolated rat hepatocytes, using a centrifugal filtration technique to allow rapid sampling. Hepatocytes were found to adsorb as well as to transport cholic acid. The adsorption was characterized by a capacity of 24 nmol/mg cell protein and by an association constant of 0.59×10^3/M. Cholic acid uptake was linear with respect to concentration at or below 10 C, suggesting an unsaturable uptake process, which may represent simple diffusion and can be quantitated by a diffusion coefficient of 1.76 pmol cholic acid/min/mg protein/

µM. Above 10 C, the uptake curve was biphasic. After subtracting the unsaturable component from uptake rates at higher temperature, a curve showing saturable kinetics resulted. The apparent K_m and V values at 37 C were calculated to be 61 µM and 0.8 nmol/min/mg protein, resp. This saturable uptake process was temperature-dependent, with an activation energy of 13 kcal/mol (5.44×10^4 joules/mol), and was inhibited by oligomycin and KCN. Countertransport was demonstrated with cholic, taurocholic, and chenodeoxycholic acids (all at 1 mM). The results suggest that cholic acid is transported by an energy-dependent carrier-mediated process, in addition to simple diffusion by hepatocytes, and that the postulated carrier has affinity for other bile acids.

1008 PHARMACOLOGY OF DIHYDROXY-DIBUTYLETHER, A SPECIFIC CHOLERETIC DRUG. (Eng.) Fregnan, G. B.; Porta, R. (Istituto Luso Farmaco d'Italia, s.r.l., Via Carnia 26, I-20132 Milan, Italy). *Arzneim. Forsch.* 26(11):2116-2124; 1976.

The choleretic and general pharmacological properties of dihydroxy-dibutyl ether (DHBE) were investigated in several animal species. DHBE increased the bile flow in conscious Sprague-Dawley rats and dogs, after both p.o. (250-750 mg/kg) and i.v. (50-750 mg/kg) administration, the maximum percent increase being 45-151%. A choleretic effect was also observed after i.v. injection into anesthetized rats and guinea pigs. A dose-response relation was always obtained, the threshold dose being 25-100 mg/kg. No evidence of tachyphylaxis was observed in rats after repeated treatments. The bile hyperflow was generally accompanied by an increased excretion of the total dry residue in guinea pigs and dogs. The choleretic effect in rats was still present after pretreatment with either DL-ethionine or atropine. At low doses (25-100 mg/kg, i.v.), DHBE did not show spasmogenic and spasmolytic effects *in vivo* on the smooth muscles of the gallbladder of guinea pigs and dogs or on the stomach and intestine of mice and dogs; it constricted the pylorus sphincter of rats. At larger doses (200-400 mg/kg, i.v.), the compound showed a mild relaxing activity on Oddi's sphincter of guinea pigs and a weak spasmogenic activity on the gallbladder or small intestine. *In vitro,* it caused an unspecific antagonism against the spasm induced by acetylcholine, barium chloride, histamine, 5-hydroxytryptamine, and norepinephrine. In anesthetized rats, rabbits, and dogs, DHBE caused a moderate and short-lasting hypotension, and tachycardia. The threshold doses for these effects were two to four times greater than choleretic doses. In conscious dogs, the compound was slighly hypertensive. DHBE did not provoke important respiratory, electrocardiogram, diuretic, or antiphlogistic effects. It remains to be determined whether the spasmogenic activity of DHBE is due to a direct action on smooth muscle or is mediated by a humoral substance.

1009 MEASUREMENT OF CONJUGATED AND UNCONJUGATED BILIRUBIN IN BILE. II. A NEW THIN-LAYER CHROMATOGRAPHIC METHOD. (Eng.) Boonyapisit, S. T.; Trotman, B. W.; Ostrow, J. D.; Olivieri, P. J.; Gallo, D. (Siriraj Hosp., Mahidol Univ., Bangkok 7, Thailand). *J. Lab. Clin. Med.* 88(5):857-863; 1976.

A new thin-layer chromatographic (TLC) method is described for the measurement of conjugated (CB) and unconjugated (UCB) bilirubin in bile; the method was used to determine the percentages of CB and UCB in normal human gallbladder bile. Bile is streaked on a silica-gel plate and developed with chloroform. Bilirubin in the mobile UCB band and stationary CB band is quantitated by diazotization from the scraped gel with *p*-iodoaniline reagent. Both CB and UCB in bile yielded identical azopigment absorbance. There was no contamination of the UCB band with either CB or oxidative derivatives of bilirubin, and over 98% of added ^{14}C-UBC migrated with the mobile band. Recoveries from TLC averaged 98.2 ± 4.3% of the applied pigment; duplicates agreed within 10%, and the method accurately detected the enzymatic and alkaline hydrolysis of CB to UCB. Concentrations of UCB in nine samples of normal human gallbladder bile were less than 1.9 mg/dl and never exceeded 1.2% of the total bilirubin.

1010 STUDIES ON BIOSYNTHESIS OF HEPATIC FERRITIN AND ITS MICROHETEROGENEITY. (Jpn.) Yokota, M. (Sapporo Medical Coll., Sapporo, Japan). *Sapporo Igaku Zasshi* 43(3):146-154; 1974.

Biosynthesis of ferritin in rat liver was studied by i.p. administration of [^{59}Fe]citrate and [^{14}C]-leucine into male Wistar rats. Incorporation of [^{14}C]leucine into hepatic ferritin reached a maximum (about 10 times the initial level) 7 hr after i.p. administration of iron (ferric ammonium citrate 500 µg/100 g), and decreased thereafter; intake of ^{59}Fe increased steadily during a 24-hr period, increasing from the 7th hr on. There was hardly any incorporation of [^{14}C]leucine into mixed liver proteins during the 24-hr period. Amounts of ferritin protein and ferritin iron per 100 g body weight increased after iron administration. Ferritin protein reached a maximum 12 hr after iron administration and decreased thereafter; ferritin iron increased steadily during a 48-hr period to a fourfold increase. Isoelectric focusing of hepatic protein (pH 5.05-5.35) after i.p. administration of [^{59}Fe]citrate (10 µCi) showed three main ferritin peaks: I (Fr. 41-49), II (Fr. 50-57), III (Fr. 63-68). Optical density measurements (280 mµ) resulted in similar spectra. The iron to protein 100 ratio at these peaks ranged from 13.1 to 13.4. The ratios 6 hr after iron injection were: I, 18.3; II, 17.7; and III, 14.6. At 12 hr the ratios were: I, 11.6; II, 11.5; and III, 7.3. At 24 hr the ratios were: I, 11.9; II, 13.2; and III, 8.4. At 48 hr the ratios were: I, 15.6; II, 19.8; and III, 15.2. *De novo* synthesis of ferritin is indicated .

1011 ROLE OF THE SPLEEN IN HEPATIC DISORDERS—EXPERIMENTAL STUDY FROM THE VIEWPOINT OF ANTIGEN ANTIBODY REACTION. (Eng.) Ishii, K.; Suzuki, O.; Kiryu, Y.; Tsuchiya, M. (Sch. Medicine, Keio Univ., 35 Shinao-machi, Shinjuku-ku, Tokyo, 160 Japan). *Gastroenterol. Jpn.* 10(2):168-173; 1975.

The role of the spleen in hepatic disorders was studied in male albino rabbits. Fifteen rabbits were sensitized with homologous liver antigen solution (5 ml, i.v.) and Freund's adjuvant and were given antigen without adjuvant twice weekly for 2-40 weeks thereafter. An increase in both the number and size of Kupffer cells and spotty necroses was seen in the parenchyma, and there was an increase in fiber formation with cell infiltration in the liver mesenchyma. A marked degree of fiber formation was seen in the liver mesenchyma of nine animals given histamine (1 mg/ml, i.v., 0.5 mg/kg) for 105 consecutive days. A third group of 31 rabbits received the same dosage of histamine, combined with liver antigen solution in adjuvant, for up to 63 weeks; granulomatous changes, as well as the proliferation of plasma cells and Kupffer cell enlargement, were observed. In the parenchyma, fiber formation with round cell infiltration was seen in most animals, and there was destruction of limiting plates, closely resembling chronic active hepatitis. This progressed to cirrhosis with pseudolobulus formation. A fourth group of 11 rabbits received follicular hormone (0.3 mg/kg, i.m.) every 4 weeks and antigen solution with adjuvant for 2-16 weeks. Enlargement and proliferation of Kupffer cells was seen in the parenchyma, and destruction of limiting plates progressed to pseudolobulus formation. Serum γ-globulin increased with splenic weight in all groups. Splenomegaly was most prominent in the fourth group, and hypergammaglobulinemia was evident in this group. In eight rabbits splenectomized before sensitization with homologous liver antigen in adjuvant, there was a marked decrease in serum γ-globulin, and hypergammaglobulinemia never occurred. In eight rabbits splenectomized after sensitization, hypergammaglobulinemia was evident, and serum γ-globulin gradually increased, although there was a transient initial decrease. These experiments indicate that sensitization with histamine and homologous liver extract can result in liver injury closely resembling chronic active hepatitis, which progresses into cirrhosis. There could be a correlation between spleen weight and increased levels of γ-globulin. The results suggest that an autoallergic mechanism might be involved in chronic liver diseases.

1012 EFFECT OF COBALT ON MICROSOMAL CYTOCHROME P-450: DIFFERENCES BETWEEN LIVER AND INTESTINAL MUCOSA.

(Eng.) Correia, M. A.; Schmid, R. (Univ. California, San Francisco Medical Center, San Francisco, CA 94143). *Biochem. Biophys. Res. Commun.* 65(4):1378-1384; 1975.

The effect of cobalt on microsomal heme oxygenase (MHO) and cytochrome P-450 was studied in the liver, spleen, and intestinal mucosa of Sprague-Dawley rats. Cobaltous chloride given in a single s.c. dose (60 mg/kg) 18 hr before sacrifice or in two separate doses of 60 mg/kg each, 42 and 18 hr, resp., before sacrifice stimulated hepatic MHO activity, depressed the cytochrome P-450 content, and reduced benzpyrene hydroxylase (BPH) activity, confirming previous reports. In contrast, cobalt increased MHO activity, the cytochrome P-450 content, and BPH activity in the intestinal mucosa. Cobalt had no effect on the spleen. The marked difference in the effect of cobalt on the liver and intestine suggests that the mechanism of the cobalt-mediated stimulation of MHO in the two tissues either differs from or is unrelated to the turnover of cytochrome P-450.

1013 STUDIES ON SUPPRESSION OF LIVER FIBROSIS: INHIBITION OF EXPERIMENTAL LIVER FIBROSIS BY CARBON TETRACHLORIDE FOLLOWING TREATMENT WITH ELASTASE.

(Jpn.) Fukuhara, M. (Nara Medical Univ., Nara, Japan). *Nara Igaku Zasshi* 26(3):198-209; 1975.

Male Sprague-Dawley rats were injected with 50% CCl_4-olive oil solution (0.3 ml/100 g body weight, twice a week, s.c.) to produce liver fibrosis. Elastase from pig pancreas (elastoproteinase, purity 100%: saline solution, 0.4 mg/100 g body weight; s.c. injection every day) was administered concurrently, sequentially, or not at all, with the CCl_4 injections. Nodule formation on the liver surface did not occur, even after 15-20 weeks, and liver cirrhosis was absent when elastase and CCl_4 were given concurrently from the beginning. Formation of liver hydroxyproline (HOP) and acid mucopolysaccaride (AMPS) was inhibited. In the recovery phase (RECP) from liver fibrosis, liver HOP remained at low levels with elastase treatment and accelerated fibrocrasia. Elastase did not affect activity of lysosomal enzymes (cathepsin, β-glucuronidase, collagenolytic activity) in the developmental phase (DEVP) of liver fibrosis. During RECP, cathepsin activity was higher in the elastase group; collagenolytic activity was higher in the nonelastase group. Incorporation of [^{14}C]glycine into liver insoluble collagen was not affected by elastase during DEVP. Turnover of liver insoluble collagen was faster in the elastase group. Disk electrophoresis observations of elastase activity on collagens extracted from guinea pig skin showed disappearance of the β-component, and presence of the α-component. The nonspecific proteolytic action of elastase seems to accelerate dissolution of collagen telopeptide, and degradation is dominant over synthesis.

1014 IMPAIRED GANGLIOSIDE SYNTHESIS IN RAT LIVER AFTER D-GALACTOSAMINE ADMINISTRATIO IN VIVO.

(Eng.) Rupprecht, E.; Hans, C.; Leonard, G.; Decker, K. (Firma K. Thomae, D-7950 Biberach/Ris W. Germany). *Biochim. Biophys. Acta* 450(1):45-56; 1

The effect of D-galactosamine (GalN) treatment on gl cosphingolipid synthesis was investigated in female Wistar rats. Hepatitis was induced by a single dose of GalN (1.85 mmol/kg, i.p.); physiological saline w used for controls. 1-[^{14}C]galactose was injected 2 after GalN, and the specific radioactivities of the glycosphingolipid precursors, uridine diphosphate (UDP)galactose and UDPglucose, were determined. Although the time course of UDPgalactose formation was nearly identical in treated and control rats, the absolute specific radioactivity in the treated anima was four times higher. The corresponding ratio for UDPglucose was 0.85:1. The specific radioactivities of the glycosphingolipids were measured 4 hr after 1-[^{14}C]galactose injection. The radioactivities of glucosylceramide (G_{L1}) and hematoside (G_{M3}) were almost the same with and without GalN pretreatment. The labeling of G_{M1} and G_{D1}, however, was decreased to <0.1 in treated livers, suggesting that their synthesis was inhibited. The specific radioactivities of glucose and galactose obtained from individual glycosphingolipids were also determined. In GalN-treated livers, the labeling of G_{L1} was not altered, and only a small change of G_{M3} could be detected, but the rate of G_{M1} and G_{D1} synthesis was ≤5% at 2, 3, and 4 hr after galactose injection. The results demonstrate an inhibition of ganglioside biosynthesis during the development of GalN injury.

1015 EFFECT OF D-GALACTOSAMINE ADMINISTRATION ON NUCLEOTIDE AND PROTEIN METABOLISM IN ISOLATED RAT KUPFFER CELLS. (Eng.) Hofmann, F.; Wagle, S. R.; Decker, K. (Biochemisches Institut an der Medizinischen Fakultat der Universitat Freiburg, Hermann-Herder Strasse 7, D-7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 357(10):1395-1400; 1976.

The effects of D-galactosamine (GalN) administration on uracil nucleotide contents and amino acid incorporation were compared in isolated Kupffer (K) cells and hepatocytes (H) of female Wistar rats. As determined by leakage of enzymes into the incubation medium and the formation of uridine triphosphate (UTP) from uridine, the K cells had a high degree of metabolic competence and viability for at least 180 min. The nucleotide contents of the K cells were lower than those of the H. When both cells were incubated with 4 mM GalN, the uridine triphosphate and uridine diphosphoglucose contents were reduced, but the effect was much smaller in the K cells. This is apparently due to low activity of the enzymes of the galactose pathway and, therefore, to a slower rate of UDP/GalN synthesis in the K cells. This interpretation was substantiated by the low rate of UDP/GalN formation (4.5 nmol/hr/g wet weight) by the K cells in the presence of 5.5 mM D-galactose. The same results were obtained when cells were isolated from GalN-pretreated animals (1.85 mmol/kg, i.p.). The incorporated radioactivity from U-[^{14}C]leucine and U-[^{14}C]aspartate was reduced to 35% in H treated with 1 mM GalN, but to only 60% in K cells. This difference was even more striking during the first hour--amino acid incorporation into H was reduced to 50%, but that into K cells was only slightly affected, if at all. Any role that K cells may play during the development of GalN hepatitis is not a result of direct action of the amino sugar on these cells.

1016 EFFECT OF 4-METHYLUMBELLIFERONE ON THE OXIDATIVE METABOLISM OF LIVER MITOCHONDRIA IN JAUNDICED RATS AND ITS RELATIONSHIP TO CHOLERETIC ACTION. (Eng.) Yamada, T.; Ohshita, M.; Ozawa, K.; Takasan, H.; Honjo, I. (Kyoto Univ. Sch. Medicine, Kyoto, Japan). *Arzneim. Forsch.* 26(11):2040-2042; 1976.

The effect of 4-methylumbelliferone (4-MU) on the oxidative metabolism of liver mitochondria and its relation to choleretic action were investigated in 40 bile duct-ligated Wistar rats and 40 rats after biliary decompression. The oxidative metabolism of liver mitochondria fell rapidly to 50% of controls within 7 days after bile duct ligation, whereas that in rats that received 4-MU as 0.8% of their diet for 7 days fell only slightly. The effect of 4-MU on the liver mitochondrial metabolism was most prominent when it was administered to rats after biliary decompression. In rats fed 4-MU, the depressed oxidative metabolism of cholestatic liver mitochondria recovered rapidly toward normal with accelerated amelioration of serum total bilirubin. In rats without 4-MU, serum bilirubin levels remained at a significantly higher level and jaundice continued after biliary decompression by loosening the ligation of the common bile duct. 4-MU appears to exert some stimulation or amelioration of the impaired liver mitochondrial metabolism due to jaundice, which may have a close relation to its choleretic action or effective bile excretory action.

1017 THE EFFECTS OF ACUTE AND CHRONIC ETHANOL ADMINISTRATION ON CANINE BILE SECRETION. (Eng.) Dzieniszewski, J.; Tiscornia, O. M.; Palasciano, G.; Domingo, N.; Cavarzan, A.; Teixeira, A. S.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Am. J. Dig. Dis.* 21(12):1037-1043; 1976.

The effects of an acute i.v. 15% ethanol infusion (1.3 g/kg for 20 min) on plateau levels of hepatic bile secretion were determined in nine dogs with gastric and duodenal fistulas. Four of the dogs had been alcohol-fed for 24 months with 50% intragastric ethanol (2.0 g/kg). Emptying of the gallbladder was induced by a continuous perfusion of secretin (0.5 clinical U/kg/hr) and cholecystokinin-pancreozymin [CCK-PZ, 8 Crick Harper-Raper (CHR) U/kg/hr] and sodium taurocholate (0.62 μmol/kg/min). In the nonalcoholic dogs, the ethanol infusion reduced the plateau values of volume (29%), bile salt concentration (55%), and output (67%) significantly, with maximum reduction occurring between 20 and 60 min after infusion. In the alcohol-fed dogs, the only significant change was a fall in volume to 25% ($p<0.05$). Bile salt concentration and output plateau values were significantly higher in the alcohol-fed dogs than in the nonalcoholic dogs. There were no differences between both groups in bile salt output, evacuation rate, or lipid composition of the gallbladder bile after a single, rapid, i.v. injection of 300 CHRU of CCK-PZ. The mechanism by which ethanol induces inhibition of bile secretion is unknown. It is suggested that it may be the result of a direct toxic action of ethanol on the enzyme and/or structural components of the hepatocytes.

1018 INDUCTION OF FATTY LIVER BY ETHANOL DRINKING IN KK AND KK-A^{y} MICE. (Eng.) Furuno, K.; Arakawa, M.; Shino, A.; Suzuoki, Z. (Biological

Res. Lab., Takeda Chemical Industries, Ltd., Yodogawa-ku, Osaka 532, Japan). *J. Nutr.* 105(10):: 1253-1262; 1975.

The induction of fatty liver in mice by liquid diets in which 25-35% of available energy was derived from ethanol was studied. KK, KK-A^y, C57BL/6J/Ta, CF1/Ta, C3H/Ta, DBA/Ta, and ICR mice were used. Four diets were used: a control T7 diet, consisting of 18% casein, 65.4% cornstarch, 10% cottonseed oil, 4% Hegsted's salt, 1.5% cellulose, 0.3% DL-methionine, 0.1% choline chloride, and 0.5% vitamin mixture; a T7-B diet, similar to T7, except for the addition of 8% hydrogenated coconut oil, 2.5% cottonseed oil, and 65% cornstarch; and diets T8 and T9, with increased casein content (25 and 30%, resp.). Liquids were either water or a 15% ethanol solution. All diets were fed for 28 weeks. The KK and KK-A^y mice were the most susceptible to fatty liver induction by ethanol, with an increase in liver fat from 18.2 to 37.1% and from 16.1 to 44.5%, resp. The ICR, C57BL/6J/Ta, and CF1/Ta strains showed some increases (0.9, 1.3, and 1.1%, resp.). Strains C3H/Ta and DBA/Ta showed little susceptibility. The KK-A^y strain was more susceptible to fatty liver induction than the KK strain. Generally, alcohol ingestion decreased food intake by 75%. There was no significant difference in plasma levels of triglycerides or immunoreactive insulin after alcohol ingestion. Fatty acid analysis after a T9 diet showed increases in palmitoleic and oleic acids and a decrease in linoleic acid. The trend towards fatty liver increased with age and was more profound in the KK-A^y strain. KK and KK-A^y mice showed greater water intake due to diabetic polydipsia. There is a possible correlation between some genetic derangement in lipid metabolism and the pathogenesis of alcoholic hyperlipemia or fatty liver.

1019 POTENTIATION OF ETHANOL FATTY LIVER IN RATS BY CHRONIC ADMINISTRATION OF NICOTINIC ACID. (Eng.) Sorrell, M. F.; Baker, H.; Tuma, D. J.; Frank, O.; Barak, A. J. (Veterans Admin. Hosp., Omaha, NB 68105). *Biochim. Biophys. Acta* 450(2):231-238; 1976.

The capacity of nicotinic acid (NA) to prevent fatty infiltration due to chronic ethanol (EtOH) ingestion in rats was studied, and the independent hepatotoxic effect of NA alone was assessed. Four groups of male Sprague-Dawley rats were fed for 28 days as follows: (1) semiliquid control diet; (2) control diet plus 50 mg/100 ml NA (approximately 150 mg/kg/day); (3) EtOH diet, control diet with EtOH substituted for carbohydrate to provide 36% of the total calories; and (4) EtOH plus NA. The growth rate of groups 1 and 2 was similar and faster than that of groups 3 and 4. NA caused a significant loss in liver weight (3.10 versus 3.38 g/100 g body weight for controls, $p<0.01$). EtOH did not alter liver weight, but it produced a significant increase in total liver protein (740 versus 680 mg/100 g for controls, $p<0.05$). NA plus EtOH, however, increased liver weight significantly above that for EtOH alone (4.18 g, $p<0.001$) and potentiated the increase in total liver protein produced by EtOH alone (830 mg, $p<0.02$). Blood EtOH levels were unaffected by NA, even though NA was well-absorbed and stored in the liver. Chronic EtOH ingestion increased hepatic levels of triacylglycerol (TAG), phospholipid (PL), and cholesterol esters (ChE). NA alone significantly increased the levels of hepatic TAG and ChE. In group 4, however, NA potentiated the hepatotoxic effect of EtOH by further increasing the hepatic levels of TAG, PL, free Ch, and ChE. NA with or without EtOH was accompanied by low plasma TAG levels, suggesting a possible inhibition of hepatic lipid transport.

1020 DIAZEPAM, ETHANOL AND DRUG METABOLIZING ENZYMES IN RAT LIVER. (Eng.) Vorne, M. S.; Puolakka, J. O.; Idanpaan-Heikkila, J. E. (Dept. Clinical Chemistry, Univ. Oulu, 90220 Oulu 22, Finland). *Arch. Int. Pharmacodyn. Ther.* 216(2): 280-287; 1975.

The effect of diazepam and/or ethanol treatment for 7 days on the drug metabolizing enzymes in rat liver microsomes was studied. Twenty-four male Sprague-Dawley rats were divided into four groups: group I served as controls; group II was given 80 mg/kg diazepam/day in carboxymethylcellulose medium; group III was given 15% (v/v) ethanol in drinking water; and group IV was given both diazepam and ethanol. Diazepam and ethanol together had a depressing effect on body weight. Ethanol alone caused a significant decrease in relative liver weights, but this effect was prevented by simultaneous diazepam treatment. Diazepam metabolism was not significantly affected in any group. The cytochrome P-450 level was increased from 13.2 to 21.6 nmol/g liver in group IV. Diazepam alone and with ethanol decreased 3,4-benzpyrene activity from 6.35 to 3.91 and 4.40 nmol/g liver/hr, resp. Only ethanol alone or with diazepam increased N-methylaniline activity from 1.17 to 1.34 or 1.69 μmol/g liver/hr. *p*-Nitrobenzoic acid reduction was inhibited by both diazepam and ethanol, but the effect was not additive when the drugs were used together. The cross-tolerance effect on metabolism of diazepam after chronic ethanol ingestion may be a type of central nervous system adaptation.

1021 INSULIN REQUIREMENTS FOR HEPATIC REGENERATION FOLLOWING HEPATECTOMY. (Eng.) Yamada, T.; Yamamoto, M.; Ozawa, K.; Honjo, I. (Kyoto Univ. Sch. Medicine, Sakyo-ky, Kyoto, Japan). *Ann. Surg.* 185(1):35-42; 1977.

On the basis of changes in the adenine nucleotide and mitochondrial metabolism of the remnant liver, insulin requirements for hepatic regeneration were studied in diabetic Wistar rats treated with varying amounts of a 2.8% solution of alloxan (35, 49, 63, or 70 mg/kg, i.v.). Mildly diabetic rat with less than 30% inhibition in maximal portal insulin response to a p.o. glucose load showed a parabolic glucose tolerance pattern and could tolerate partial hepatectomy. In contrast, severely diabetic rats with more than 45% inhibition showed a linear glucose tolerance pattern and died within 24 hr after partial hepatectomy. In the former rats, the energy charge (ATP + ½ADP/ATP + ADP +

MP) levels of the remnant liver decreased slightly
oon after partial hepatectomy but could be rapidly
estored to normal levels with a concomitant rise
f oxidative phosphorylation in remnant liver mito-
hondria. The energy charge levels in the latter
roups fell more markedly and could not be restored
ecause of insufficient enhancement of mitochondrial
idative phosphorylation. An enhancement in mito-
hondrial phosphorylative activity of the remnant
ver following partial hepatectomy may be inhibited
proportion to the severity of impaired insulin
cretion, resulting in a decrease of the potential
nctional capacity of liver.

22 CORRELATION BETWEEN SERUM HIGH DENSITY
LIPOPROTEIN CONTENT AND LIVER FUNCTION
RING EXPERIMENTAL HEPATIC DEGENERATION AND RE-
NERATION. (Eng.) von Lehmann, B.; Grajewski, O.;
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experimental model of liver damage by i.v. injec-
on of 10 mg/kg praseodymium nitrate into female
star rats was used to compare the time course of
ver degeneration and regeneration with that of serum
gh-density lipoprotein (HDL) content. Serum HDL
ntent rapidly decreased to a minimum 24 to 48 hr
ter injection of praseodymium, returning to control
lues after 4 days. The time course of the total li-
d content behaved similarly. Liver degeneration was
racterized by SGOT, SGPT, and serum sorbitdehydro-
nase activities and by hepatic spermidine concentra-
n, nuclear RNA polymerase reactions, and ribosomal
tein synthesis. The serum enzymes began to increase
er 24 hr, and reached a maximum after 48 hr. The
racellular parameters decreased maximally within the
st 24 hr. Although they returned to control values
er 72 hr, the enzymes still showed activities around
00 mU/ml at this time. Liver regeneration was
racterized by ornithine decarboxylase, deoxycyti-
ate deaminase, and thymidine kinase activities and
rescine concentrations. The time course of these
ameters showed that regeneration was maximum after
days. The findings indicate that serum HDL content
relates well with the time course of the parameters
degeneration and regeneration and that it represents
functional state of the liver.

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EXTRACTION RATIO AS LIVER FUNCTION TESTS
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CIFIC MEMBRANE PROTEIN: STUDIES IN HEPATIC AND
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1078 BILE ACID CONJUGATION IN RODENT FETAL HEPATIC ORGAN CULTURE [Abstract]. (Eng.) de Belle, R. C.; Blacklow, N. R.; Baylan, M.; Little J. M.; Lester, R. (Dept. Pediatrics and Medicine, McGill Univ., Montreal, Quebec, Canada). *Clin. Res.* 23(5):620A; 1975.

1079 ACTIVATION OF LIPASE BY A FACTOR PRESENT IN THE GALL-BLADDER EPITHELIUM. (Eng.) Fedeli, G.; Guarnieri, C.; Fussi, F. (Istituto di Chimica Biologica dell'Universita di Parma-Ospedale Maggiore, Italy). *Ital. J. Biochem.* 24(6):309-316; 1975.

1080 EFFECT OF "DRUGS FOR LIVER DISEASE" ON HEPATOTOXIC ACTION OF CARBON TETRACHLORI
I. CHANGES OF LYSOSOMAL ENZYME LEVELS AND EFFECT
PROTOPORPHYRIN ON THE LEVELS. (Eng.) Ogiso, T.; Kobayashi, T.; Kato, Y. (Gifu Coll. Pharmacy, Gifu Japan). *Jpn. J. Pharmacol.* 25(4):401-409; 1975.

1081 EFFECT OF "DRUGS FOR LIVER DISEASE" ON HEPATOTOXIC ACTION OF CARBON TETRACHLORI
II. EFFECT OF PROTOPORPHYRIN AND PHOSPHORYLCHOLIN
ON MICROSOMAL DRUG-METABOLIZING ENZYME ACTIVITIES
AND THE COMPONENTS IN INJURED LIVER. (Eng.) Ogis
T.; Kobayashi, T.; Kuhara, K.; Kato, Y. (Gifu Coll
Pharmacy, Gifu, Japan). *Jpn. J. Pharmacol.* 25(4)
411-421; 1975.

1082 DRUG INDUCTION AND EXPERIMENTAL CHOLEST
SIS. (Eng.) Marmo, E.; Di Mezza, F.;
Brita, G.; Grella, A.; Alfano, C. (Dept. Pharmaco
ogy, Univ. Naples, Naples, Italy). *Res. Commun. Chem. Pathol. Pharmacol.* 13(3):521-528; 1976.

1083 POTENTIATING EFFECTS OF C-TERMINAL OCTA
PEPTIDE OF CHOLECYSTOKININ ON CONTRACTI

OF ISOLATED GUINEA-PIG GALLBLADDER. (Eng.) Fujiwara, M.; Azuma, H. (Dept. Pharmacology, Kyoto Univ., Kyoto, Japan). *Jpn. J. Pharmacol.* 25(4):478-480; 1975.

See also, 0863, 0865, 0906, 0910, 0989, 1103, 1156, 1164, 1165, 1170, 1172, 1497, 1609.

SECRETION AND METABOLISM

Intestine

1084 THE PRESENCE OF AROMATIC L-AMINO ACID DECARBOXYLASE IN CERTAIN INTESTINAL NERVE CELLS. (Eng.) Costa, M.; Furness, J. B.; McLean, J. R. (Sch. Medicine, Flinders Univ. South Australia, Bedford Park, South Australia 5042, Australia). *Histochemistry* 48(2):129-143; 1976.

Neurons containing aromatic l-amino acid decarboxylase (AADC) were sought in the intrinsic plexuses of the guinea pig small intestine by incubating segments of intestine with L-dopa (2×10^{-6} M) in the presence of an inhibitor of monoamine oxidase, pargyline (5×10^{-6} M). After such incubation, some nerve cell bodies gave a fluorescence histochemical reaction indicative of the presence of a decarboxylated product of L-dopa, probably dopamine. No fluorescence reaction occurred in the unincubated control or when the RO 4-4602 inhibitor of AADC was included in the incubation mixture. The AADC-containing cell bodies apparently do not take up and store dopamine, because fluorescence could not be detected after incubation with dopamine and a monoamine oxidase inhibitor. The AADC-containing cells were found in about half of the ganglia of the submucous plexus of the guinea pig small intestine, but were found less frequently in the myenteric plexus. They were also found in both enteric plexuses of the guinea pig distal colon and of the small intestines of rabbits and rats.

1085 HYDROLYSIS OF PEPTIDES WITHIN LUMEN OF SMALL INTESTINE. (Eng.) Silk, D. B. A.; Nicholson, J. A.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA 94121). *Am. J. Physiol.* 231(5):1322-1329; 1976.

The quantitative significance of intraluminal peptide hydrolases in the terminal stages of peptide digestion was investigated in Wistar rats, and the precise origins of these enzymes were determined. Intestinal contents and mucosae were obtained from rats anesthetized with ether. Experiments carried out on pancreaticobiliary secretions, and germfree rats showed that pancreatic and bacterial enzymes do not contribute significantly to the luminal digestion of dipeptides. Chemical assay data, thermostability studies, and the examination of electrophoretic mobilities of luminal peptide hydrolases indicated that jejunal enzymes originate predominantly in the cytoplasm of intestinal mucosal cells, whereas the brush border of mucosal cells is a major source of the enzymes in the ileum. With glycyl-L-phenylalanine and L-phenylalanyl-glycine as substrates, jejunal luminal activity was less than 2.6% of mucosal activity. Brush border peptide hydrolase activity in ileal contents, however, was 11.9% and 40.7% of mucosal brush border activity for the two substrates, resp. Luminal enzymes thus play an insignificant role in the terminal digestion of peptides in the jejunum, but have a much more important role in the ileal digestion of peptides.

1086 EFFECTS OF CHOLERA TOXIN ON CELLULAR AND PARACELLULAR SODIUM FLUXES IN RABBIT ILEUM. (Eng.) Desjeux, J. F.; Tai, Y. H.; Powell, D. W.; Curran, P. F. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Biochim. Biophys. Acta* 448(2):352-367; 1976.

The effects of cholera toxin on the cellular and paracellular pathways of Na$^+$ movement were studied in rabbit ileum. Unidirectional Na$^+$ fluxes were examined as functions of applied potential in control tissues and in tissues from the same animal treated with purified cholera toxin. Treatment of ileum *in vitro* with toxin stimulated the cellular component of serosa-to-mucosa Na$^+$ flux (from 2.41 ± 0.49 μEq/hr/cm^2 under control conditions to 4.71 ± 0.43 μEq/hr/cm^2 after treatment with toxin, $p<0.01$). Cholera toxin had no apparent effect on Na$^+$ movement through the cells from mucosa to serosa. A marked decrease in the Na$^+$ permeability ($p<0.01$) and no detectable significant changes in transference number for Na$^+$ of the paracellular shunt pathway were observed following treatment with cholera toxin. These results provide direct evidence for the hypothesis that purified cholera toxin stimulates active sodium secretion, but has minimal effect on sodium absorption.

1087 EFFECT OF EXTENSIVE RESECTION OF SMALL INTESTINE ON THE ENTEROCHROMAFFIN CELLS OF THE REMAINING INTESTINAL SEGMENT. (Eng.) Drews, M.; Gawronski, M. (Medical Acad. Poznan, Poznan, Poland). *Pol. Med. Sci. Hist. Bull.* 15/13(5/6):613-617; 1975.

1088 HISTOENZYMATIC STUDIES ON THE ADAPTATION OF VILLI OF THE SMALL INTESTINE SEGMENT LEFT AFTER EXTENSIVE ENTEROTOMY. (Eng.) Gawronski, M.; Mastynska, M.; Dworak, Z.; Kadlubowska, M.; Stajgis, P. (Zaklad Anatomii Patologicznej, ul.

Przybyszewskiego 49, 60-355 Poznan, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(5/6):619-624; 1975.

1089 INTESTINAL PHASE OF PROTEIN ASSIMILATION IN MAN. (Eng.) Adibi, S. A. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *Am. J. Clin. Nutr.* 29(2):205-215; 1976.

1090 SOLUBILIZATION OF THE HUMAN INTESTINAL BRUSH BORDER MEMBRANE ENZYMES [Abstract]. (Eng.) Maestracci, D. (Centre Hospitalier Universitaire, Sherbrooke, P.Q., Canada). *Digestion* 13(3): 179; 1975.

1091 ACTIVATION IN INTESTINAL MUCOSAL ADENYLATE CYCLASE (AC) BY Shigella dysenteriae I ENTEROTOXIN [Abstract]. (Eng.) Charney, A. N.; Gots, R. E.; Formal, S. B.; Gianella, R. A. (Walter Reed Army Inst. Res., Washington, DC). *Clin. Res.* 23(4):480A; 1975.

1092 INTESTINAL AMYLASE ACTIVITY IN THE HAMSTER [Abstract]. (Eng.) Senegas, F.; Pradayrol, L.; Balas, D.; Ribet, A. (CHU Rangueil, Toulouse, France). *Digestion* 13(3):186-187; 1975.

1093 STUDIES OF L-ARGINASE OF THE SMALL INTESTINE: I. TOPOGRAPHICAL DISTRIBUTION AND SOME PROPERTIES OF THE SMALL INTESTINE L-ARGINASE IN THE RAT. (Eng.) Konarska, L.; Tomaszewski, L. (Medical Sch. Warsaw, Inst. Biopharmacy, ul. Banacha 1, 02-097 Warszawa, Poland). *Biochem. Med.* 14(3): 250-262; 1976.

1094 THE EFFECT OF METHOTREXATE ON DISACCHARIDASE ACTIVITY IN THE RAT. (Eng.) Cantor, D. S.; Marrone, J. O.; Costa, J. A.; Cecchetti, J. (Servicio de Gastroenterologia y Patologia, Policlinico Alejandro Posadas, Haedo, Buenos Aires, Argentina). *Medicina (Buenos Aires)* 35(4):416-419; 1975.

1095 GLUCONEOGENESIS IN INTACT JEJUNAL MUCOSAL CELLS FROM GUINEA PIG [Abstract]. (Eng.) Anderson, J. W.; Bridges, S. R. (Veterans Admin. Hosp., Lexington, KY). *Clin. Res.* 23(4):534A; 1975.

1096 REGULATION OF RAT PROXIMAL SMALL INTESTINAL ENZYME ACTIVITY BY ILEAL GLUCOSE PERFUSION [Abstract]. (Eng.) Espinoza, J.; Clark, S. B.; Hritz, A.; Rosensweig, N. S. (St. Luke's Hosp., New York, NY). *Clin. Res.* 23(5):577A; 1975.

1097 INFLUENCE OF SOME ANTIBIOTICS ON THE INTESTINAL GLYCOSIDASES OF THE RAT. (Spa.) Gay, E.; Castro, M.; Gonalons, E.; Vericat, F.; Torralba, A. (Departamento de Fisiologia Animal Aplicada, Universidad de Barcelona, Barcelona 14, Spain). *Rev. Esp. Fisiol.* 31(3):183-186; 1975.

1098 LUMINAL LECITHIN, A PRECURSOR OF CHYLOMICRON LECITHIN [Abstract]. (Eng.) Mansbach, C. M., II (Veterans Admin. Hosp., Durham, NC). *Clin. Res.* 24(1):45A; 1976.

1099 DIAMINE OXIDASES IN THE SMALL INTESTINE OF RABBITS, DOGS AND PIGS: SEPARATION FROM SOLUBLE MONOAMINE OXIDASES AND SUBSTRATE SPECIFICITY OF THE ENZYMES. (Eng.) Kusche, J.; Schmidt, J.; Schmidt, A.; Lorenz, W. (Surgery Clinic of the Unive sity, Robert-Koch-Strasse 8, D-355 Marburg a.d. Lahn W. Germany). *Agents Actions* 5(5):440-441; 1975.

1100 GALACTOSE OXIDASE AS A TOOL TO LABEL A GLYCOPROTEIN AND TO STUDY ITS FIXATION ON ISOLATED GUINEA-PIG ILEUM RECEPTORS. (Eng.) Feger, J.; Durand, G.; Lebel, B.; Agneray, J. (Universite Paris-Sud, Centre d'Etudes Pharmaceutiques, Departement de Biochimie, 92290 Chatenay-Malabry, France). *Agents Actions* 5(5):448-449; 1975.

1101 INTESTINAL CONCENTRATION OF ^{99m}Tc-PERTECHNETATE INTO ISOLATED LOOPS OF RAT BOWEL. (Eng.) Taylor, A. T., Jr.; Alazraki, N.; Henry, J. E. (Veterans Admin. Hosp., 3350 La Jolla Village Dr., San Diego, CA 92161). *J. Nucl. Med.* 17(6): 470-472; 1976.

See also, 0872, 0873, 0883, 0954, 1012, 1115, 1126, 1137, 1336, 1337, 1341.

GENERAL

1102 TRITIATED THYMIDINE AUTORADIOGRAPHIC STUDY OF CELL MIGRATION RENEWAL IN THE PYLORIC MUCOSA OF GOLDEN HAMSTERS. (Eng.) Hattori, T.; Fujita, S. (Kyoto Prefectural Univ. Medicine, Kawaramachi-hirokoji, Kamikyo, Kyoto, Japan). *Cell Tissue Res.* 175(1):49-57; 1976.

The kinetics of cell proliferation, migration, and renewal in the pyloric mucosa of golden hamsters were studied by flash, cumulative, and pulse labeling autoradiography following [^{3}H]thymidine injections. Flash labeling autoradiography showed that the labeled epithelial cells were exclusively confined to a zone several cells wide in the region of the isthmus between the gastric pits and the pyloric glands. The cumulative and pulse labeling experiments showed that this cell proliferation in the isthmus region was involved in the replacement of both the surface epithelial and the glandular cells. The surface epithelial cells of the pyloric mucosa arising in the upper portion of the isthmus lined the pits and the surface and were sloughed off into the gastric lumen within a week. The mucin-containing glandular cells, which arose more deeply in the isthmus region, migrated downwards and were apparently lost at the deepest level of the glands. The life span of the mucin-containing glandular cells was estimated at about 14 days. This cell type appeared to undergo renewal of the "first produced, first lost" pipe line variety. However, a small number of glandular cells survived for over 20 days (up to 30 days), suggesting the existence of a subpopulation of cells with different kinetics in the pyloric glands.

1103 EFFECT OF PROTEIN SYNTHESIS INHIBITORS ON THE ACTIVITY OF ENZYMES--CHOLESTASIS INHIBITORS--IN EXPERIMENTAL MECHANICAL JAUNDICE.

(Pol.) Kryszewski, A.; Whitfield, J. B.; Neale, G.; Moss, D. W. (Royal Postgraduate Medical Sch., London, England). *Przegl. Lek.* 32(4):411-415; 1975.

The changes in alkaline phosphatase (APH), 5-nucleotidase (5-NT), and gamma-glutamylotranspeptidase (GGTP) levels in the serum and liver of male Wistar rats with induced cholestasis due to common bile duct ligation were studied for 8 days after the onset of jaundice. The animals were sacrificed 12, 24, 48, 96, and 120 hr after the operation. They were exsanguinated, and their serum was retained. Controls were not ligated. Other animals were given cycloheximide (1 μg/g, i.p.) and actinomycin D (0.25 μg/g, i.p.), 1 hr before ligation; they were sacrificed 24 hr later. Apart from securing their serum, the livers of the second group were homogenized and their protein concentration was determined. APH, 5-NT, and GGTP showed higher liver activity after surgery, with 5-NT and GGTP being significantly increased after only 96 hr, while APH reached its maximal level after 12 hr. In serum, APH and 5'-NT attained maximal activity after 24 hr, whereas GGTP did not reach maximum within the 8-day study period. Both cycloheximide and ac-inomycin D partially inhibited APH increases in the iver and serum and significantly reduced APH ctivity in the control serum. The decreases were pos-ibly attributable to an alteration of intestinal hosphatase synthesis. The similarity of changes in hree enzymes in clinical observations of liver and iliary tract patients to those noted in the animal tudy was pointed out.

104 STUDIES ON ORGAN SPECIFIC ANTIGENS OF THE COLONIC MUCOSA: THE RELATIONSHIP F COLON SPECIFIC ANTIGENS TO ULCERATIVE COLITIS.

Jpn.) Kuroe, K. (Hirosaki Univ. Sch. Medicine, irosaki, Japan). *Hirosaki Igaku* 27(3):504-522; 975.

Sera of patients with ulcerative colitis were studied from the standpoint of organ-specific antigens of the colon. Reactions of the rabbit sera treated with antisera of rat colonic mucosa were also examined. Water-soluble mucosal human antigens were prepared from various sections of the digestive tracts of persons with O blood type. Organ antigens from rats and rabbits were prepared from mature animals killed after being administered tetracycline (4 mg/day for 5 days, p.o.). Antisera were prepared by injecting the antigens s.c. into mature rabbits once a week for 12 weeks. Reactions between rabbit antisera and human colonic mucosa were tested with the micro-Ouchterlony method. After adsorption with human sera, liver, and gastric mucosa, the antisera formed a common precipitation line with the microsomal fraction of the human colonic mucosa and the mucosa of the small intestine. Positive immunofluorescent (IF) staining of epithelial cells of the human colon was evident. Antigen present in the microsomal fraction was common to both the colon and small intestine. In another IF antibody study, serum from rabbits immunized with rat colon extract reacted with its own colon and small intestinal mucosa. Multiple colonic hemorrhages and ulcerations occurred in 2/10 rabbits receiving saline extract injections of rat colon. Human colonic antigens were reacted with sera of 31 patients with ulcerative colitis. Positive responses not specific to ulcerative colitis occurred in five cases with the hemagglutination method (tannic acid-treated erythrocyte), in four cases with the autoimmune complement fixation test, and in two cases with IF antibody method. Data were insufficient to support the hypothesis that ulcerative colitis is an autoimmune disease.

1105 EMBRYOLOGICAL INTERPRETATION OF THE ANATOMY OF THE DIGESTIVE (ABDOMINAL) ARTERIES.

(Fre.) Barth, M.; Tongio, J.; Warter, P. (Hopital civil, F 67005 Strasbourg Cedex, France). *Ann. Radiol. (Paris)* 19(3):305-313; 1976.

1106 MALNUTRITION STUDIES IN Macaca mulatta. IV. ENERGY AND PROTEIN CONSUMPTION DURING GROWTH FAILURE AND "CATCH-UP" GROWTH.

(Eng.) Kerr, G. R.; el Lozy, M.; Scheffler, G. (Harvard Sch. Public Health, Boston, MA). *Am. J. Clin. Nutr.* 28(12):1354-1376; 1975.

1107 EFFECT OF ANABOLICS ON AMINO ACID IMBALANCE IN SHORT TERM EXPERIMENTS. IV. EFFECTS OF STANOZOLOL ON PLASMA PROTEINS IN RATS.

(Eng.) Sanahuja, J. C.; Rio, M. E.; Slobodianik, N. H.; Oriozabala, M. A.; Infante, A. (Dept. Nutrition and Food Sciences, Univ. Buenos Aires, Junin 956, Buenos Aires, Argentina). *Nutr. Rep. Int.* 13(1): 53-64; 1976.

1108 THE DOSE-DEPENDENT EFFECTS OF INGESTED CHRYSOTILE ON DNA SYNTHESIS IN THE GASTROINTESTINAL TRACT, LIVER, AND PANCREAS OF THE RAT.

(Eng.) Amacher, D. E.; Alarif, A.; Epstein, S. S.

(Case Western Reserve Univ., Sch. Medicine, Cleveland, OH 44106). *Environ. Res.* 10(2):208-216; 1975.

1109 TWO PHASES OF CHORDA-LINGUAL INDUCED VASODILATATION IN THE CAT'S SUBMANDIBULAR GLAND DURING PROLONGED PERFUSION WITH LOCKE SOLUTION. (Eng.) Poulsen, J. H. (Inst. Medical Physiology A, Univ. Copenhagen, DK-2100 Copenhagen O, Denmark). *J. Physiol. (Lond.)* 253(1):79-94; 1975. 94; 1975.

1110 IMMUNOGLOBULIN AND PLASMA CELL RESPONSE IN THE INTESTINAL MUCOSA AND SALIVARY GLAND AFTER EXPERIMENTAL INFECTION OF PIGS WITH TGE VIRUS [Abstract]. (Eng.) De Buysscher, E. V.; Berman, D. T. (Univ. Wisconsin, Madison, WI 53706). *Fed. Proc.* 35(3):415; 1976.

1111 THE EFFICACY OF ISOLATED COLOSTRAL IgG, IgA AND IgM TO PROTECT NEONATAL PIGS AGAINST THE CORONAVIRUS OF TRANSMISSIBLE GASTROENTERITIS (TGE) [Abstract]. (Eng.) Stone, S. S.; Kemeny, L. G.; Woods, R. D.; Jensen, M. T. (NADC, Ames, IA 50010). *Fed. Proc.* 35(3):415; 1976.

1112 IMMUNOLOGICAL STUDIES WITH DEOXYCHOLIC ACID ON RABBITS [Abstract]. (Eng.) Matern, S.; Liomin, E.; Buscher, H. P.; Oehlert, W.; Gerok, W. (Medical Dept., Univ. Freiburg, Freiburg, W. Germany). *Digestion* 12(4/6):331; 1975.

1113 EPOXIDE TO OLEFIN: A NOVEL BIOTRANSFORMATION IN THE RUMEN. (Eng.) Ivie, G. W. (Veterinary Toxicology Entomology Res. Lab., Agricultural Res. Service, U.S. Dept. Agriculture, College Station, TX 77840). *Science* 191(4230):959-961; 1976.

1114 INTESTINAL CHALONE: A METHOD FOR ASSAY [Abstract]. (Eng.) Sassier, P.; Bergeron, M. (Departement de physiologie, Universite de Montreal, P.Q., Canada). *Digestion* 13(3):185; 1975.

1115 SOLUBILIZATION AND PARTIAL PURIFICATION OF A RAT INTESTINAL 1,25-DIHYDROXYVITAMIN D_3 BINDING PROTEIN. (Eng.) Frolik, C. A.; DeLuca, H. F. (Dept. Biochemistry, Univ. Wisconsin-Madison, Madison, WI 53706). *Steroids* 26(5):683-685; 1975.

1116 ESTERIFICATION OF FECAL BILE ACIDS BY THE INTESTINAL MICROFLORA [Abstract]. (Eng.) Kelsey, M. I.; Sexton, S. A. (NCI Frederick Cancer Res. Center, Frederick, MD 21701). *Fed. Proc.* 35(7):1710; 1976.

1117 UPPER INTESTINAL MICROFLORA PATTERNS FOLLOWING GASTRIC SURGERY. (Eng.) DeOrio, A. J.; Francescatti, D. S.; Gelbart, S. M.; Reinhardt, G. F.; Greenlee, H. B. (Veterans Admin. Hosp., Hines, IL). *Surg. Forum* 26:401-403; 1975.

1118 EFFECT OF PROSTAGLANDINS ON EXPERIMENTAL PARALYTIC ILEUS. (Eng.) Grmoljez, P. F.; Kaminski, D. L.; Willman, V. L. (St. Louis Univ. Sch. Medicine, St. Louis, MO). *Surg. Forum* 26:400-401; 1975.

1119 ORAL INTAKE MAINTAINS SMALL INTESTINAL MASS, IN PART, BY FACTORS OTHER THAN DIRECT CONTACT WITH THE SMALL BOWEL [Abstract]. (Eng.) Dworkin, L. D.; Levine, G. M. (Veterans Admin. Hosp., Philadelphia, PA). *Clin. Res.* 23(5):576A; 1975.

1120 STUDIES OF SMALL INTESTINAL VILLUS BLOOD FLOW [Abstract]. (Eng.) Bond, J. H.; Micflickier, A. B.; Levitt, M. D. (Veterans Admin. Hosp., Minneapolis, MN). *Clin. Res.* 23(4):517A; 1975.

1121 EFFECTS OF NASAL STIMULATION ON THE SMALL INTESTINAL VASCULATURE OF THE ANAESTHETIZED CAT. (Eng.) Powis, D. A.; Richardson, P. D. I. (St. Bartholomew's Hosp., Charterhouse Square, London, EC1M B6Q, England). *J. Physiol. (Lond.)* 254(1):53P-54P; 1976.

1122 ISOLATION AND FUNCTIONAL CHARACTERIZATION OF HUMAN INTESTINAL SUBMUCOSAL LYMPHOID CELLS [Abstract]. (Eng.) Bull, D. M.; Bookman, M. A. (Harvard Medical Sch., Boston, MA). *Clin. Re* 24(3):431A; 1976.

1123 STUDIES ON THE INFLUENCE OF THE COLON CONTENTS ON THE SMALL INTESTINAL MUCOSA. (Ger.) Menge, H.; Robinson, J. W. L.; Mirkovitch, V. (Medizinische Universitats-Klinik, Mannkopffstrasse 1, D-355 Marburg/Lahn, W. Germany). *Helv. Chir. Acta* 43(1/2):189-190; 1976.

1124 CELLULAR LOCALIZATION OF INTESTINAL CALCIUM-BINDING PROTEIN IN PIG DUODENUM. (Eng.) Arnold, B. M.; Kovacs, K.; Murray, T. M. (St. Michael's Hosp., Toronto, Ontario, Canada). *Digestion* 14(1):77-84; 1976.

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1126 THE EFFECT OF MAJOR SMALL BOWEL RESECTIO ON SERUM PROTEINS IN THE RAT [Abstract]. (Eng.) Urban, E. (Dept. Medicine, Univ. Texas Health Science Center, San Antonio, TX). *Clin. Re* 24(1):45A; 1976.

1127 CHANGES IN THE RAT SMALL INTESTINE AFTER SUBTOTAL COLECTOMY [Abstract]. (Eng.) Masesa, P. C. (Dept. Physiology, Univ. Edinburgh, Edinburgh, Scotland). *J. Physiol. (Lond.)* 256(1): 46P-47P; 1976.

1128 SHORT SMALL BOWEL TRANSPLANTATION. AN EXPERIMENTAL STUDY ON DOGS. (Eng.) Piegari, V.; Livrea, A.; Parmeggiani, U.; Zeccolini, R.; Lo Schiavo, F.; Barbarisi, A.; Di Tommaso, G.; *et al.* (Facolta de Medicina e Chirurgia dell'Universita di Napoli, Naples, Italy). *Surg. Ital.* 5(3): 175-180; 1975.

1129 PANCREATICODUODENAL TRANSPLANTATION IN JUVENILE SYRIAN AND CHINESE HAMSTERS. (Eng.) Sayers, H. J.; Lee, S.; Orloff, M. J. (Univ. California, Sch. Medicine, San Diego, CA). *Surg. Forum* 26:454-456; 1975.

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1132 STUDIES ON THE CUMULATION OF THE TOXIC EFFECT OF INDOMETHACIN. (Eng.) Naciazek-Wieniawska, A.; Krus, S. (Dept. Pharmacology, Inst. Drug Res., Warsaw, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(1):35-39; 1975.

1133 FUNCTIONAL, BIOCHEMICAL AND MORPHOLOGICAL ALTERATIONS IN THE INTESTINES OF RATS WITH AN EXPERIMENTAL BLIND-LOOP SYNDROME. (Eng.) Bloch, R.; Menge, H.; Lorenz-Meyer, H.; Stockert, H. G.; Riecken, E. O. (Medizinische Universitats-klinik Marburg/Lahn, W. Germany). *Res. Exp. Med.* 166(1):67-78; 1975.

1134 PROTEIN-LOSING ENTEROPATHY AND AMINO ACID CATABOLISM IN THE BLIND LOOP SYNDROME: STUDIES INCLUDING A NEWLY DEVELOPED ^{14}C AMINO ACID BREATH TEST [Abstract]. (Eng.) King, C.; Lorenz, E.; Toskes, P. (Gainesville Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 24(1):12A; 1976.

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1137 STOMACH AND UPPER INTESTINE OF THE RAT IN THE REGULATION OF FOOD INTAKE. (Eng.) Lepkovsky, S.; Dimick, M. K.; Furuta, F.; Feldman, S. E.; Park, R. (Dept. Poultry Husbandry, Univ. California, Berkeley, CA 94720). *J. Nutr.* 105(12): 1491-1499; 1975.

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1152 STUDY ON THE PROTECTIVE EFFECT OF VITAMIN A ON STRESS ULCER IN THE RAT. (Ger.) Schumpelick, V.; Farthmann, E. (Universitat Hamburg, Universitatskrankenhaus Eppendorf, Chirurgische Klinik, Martinistr. 52 -02-, 2 Hamburg 20, W. Germany *Arzneim. Forsch.* 26(3):386-388; 1976.

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1159 EFFECT OF THE EXTRAHEPATIC COLLOID GOLD (^{198}Au) UPTAKE ON ITS BLOOD DISAPPEARANC RATE [Abstract]. (Eng.) Kostic, K.; Perisic, V.; Rolovic, Z. (Radioisotope Lab. Clinical Depts. A Beograd, Yugoslavia). *Digestion* 12(4/6):320-321; 1975.

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1170 EFFECTS OF THE HYPOLIPIDEMIC AGENTS NAFENOPIN AND CLOFIBRATE ON THE HEPATIC DISPOSITION OF ORGANIC COMPOUNDS IN THE RAT [Abstract]. (Eng.) Meijer, D. K. F.; Levine, W. G. (Dept. Pharmacology, State Univ. Groningen, Groningen, Netherlands). *Digestion* 12(4/6):332; 1975.

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1172 INFLUENCE OF RIFAMPICIN ON LIVER VOLUME, LIVER FUNCTION TESTS AND HEPATIC DRUG METABOLISM IN HEALTHY VOLUNTEERS [Abstract]. (Eng.) Richter, E.; Zilly, W.; Buchenau, D.; Wernze, H.; Breimer, D. D. (Dept. Internal Medicine, Univ. Wurzburg, Wurzburg, W. Germany). *Digestion* 12(4/6):343; 1975.

1173 LIVER PROTECTION BY SILYMARIN: IN VITRO EFFECT ON DISSOCIATED RAT HEPATOCYTES. (Eng.) Ramellini, G.; Meldolesi, J. (Dept. Pharmacology, Univ. Milan, Milan, Italy). *Arzneim. Forsch.* 26(1):69-73; 1976.

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1175 AUTOREGULATORY ESCAPE FROM VASOPRESSIN INDUCED CANINE HEPATIC ARTERIAL CONSTRICTION [Abstract]. (Eng.) Kerr, J. C.; Reynolds, D. G.; Swan, K. G. (New Jersey Medical Sch., Newark, NJ). *Clin. Res.* 23(5):578A; 1975.

1176 EFFICACY OF 9-β-D-ARABINOFURANOSYLHYPOXANTHINE 5'-MONOPHOSPHATE IN THERAPY OF EQUINE ABORTION VIRUS-INDUCED HEPATITIS IN HAMSTERS. (Eng.) Allen, L. B.; Huffman, J. H.; Revankar, G. R.; Tolman, R. L.; Simon, L. N.; Robins, R. K.; Sidwell, R. W. (ICN Pharmaceuticals, Inc., Irvine, CA 92664). *Antimicrob. Agents Chemother.* 8(4):474-478; 1975.

See also, 0858, 0864, 1204, 1224, 1638, 1660, 1671.

DIAGNOSTIC PROCEDURES

1177 THE RADIOLOGIC MANIFESTATIONS OF IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION. (Eng.) Schuffler, M. D.; Rohrmann, C. A., Jr.; Templeton, F. E. (Univ. Washington Sch. Medicine, Seattle, WA 98114). *Am. J. Roentgenol.* 127(5):729-736; 1976.

Six patients with idiopathic intestinal pseudoobstruction underwent extensive radiographic evaluation of the gastrointestinal tract. Two patients had mild, nonspecific gaseous distension of the small bowel, and four patients had marked small bowel and colonic distension. Propulsive motor activity was consistently absent. All patients had smooth muscle dysfunction of the esophagus, small bowel, and colon, and two patients had abnormal gastric emptying. Two forms of the syndrome were observed, characterized by either hyper- or hypoactive smooth muscle. In the hyperactive form, chaotic, spontaneous contractions of the esophagus and small intestine occurred, and extensive diverticular disease of the colon was present. In the hypoactive form, the esophagus was atonic, and there was marked widening and hypomotility of the small intestine and colon. The presence of two forms of smooth muscle dysfunction suggests that the syndrome has a heterogeneous pathology and pathophysiology.

1178 AIR CONTRAST COLON EXAMINATION IN PATIENTS WITH COLOSTOMIES. (Eng.) Goldstein, H. M.; Miller, M. H. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Am. J. Roentgenol.* 127(4):607-610; 1976.

A readily feasible technique for performing air contrast barium enemas in patients with colostomies is described. A number 26-30 French soft rubber catheter is inserted through the enlarged hole of an infant feeding nipple from which the tip has been cut off. A large bore needle attached to a sphygmomanometer bulb is piggybacked into the catheter. The patient is subjected to an 18-hr bowel preparation, consisting of a liquid diet, hydration, and cathartics. The patient inserts the catheter through the colostomy stoma and 6-10 inches into the descending colon. When the catheter is in position, the nipple is guided down the catheter and placed into the stoma. The patient presses the flat edge of the nipple base against the colostomy stoma to prevent barium leakage. This technique has been carried out in over 80 patients. It is well tolerated and may be completed in 30-40 min. Adequate to excellent results are obtained in all well prepared patients who are able to insert the tubing for approximately 6 inches and subsequently cooperate by maintaining manual pressure on the nipple base.

1179 GAS CHROMATOGRAPHIC ANALYSES OF INTESTINAL GAS TO CLARIFY THE QUESTION OF INERT GAS INSUFFLATION IN ELECTROSURGICAL ENDOSCOPY. (Eng.) Fruhmorgen, P.; Joachim, G. (Med. Klinik mit Poliklinik der Universitat Erlangen-Nurnberg, Krankenhausstr. 12, 8520 Erlangen, W. Germany). *Endoscopy* 8(3):133-136; 1976.

To study the necessity of inert gas insufflation for the prevention of gas explosions during electrosurgical interventions in the intestinal lumen, the concentrations of hydrogen and methane were measured by gas chromatography in 41 patients prepared in one of three ways: group 1 (10 patients), no clearing of the intestine and stimulation of the production of gas (meals of beans); group 2 (16 patients), no clearing of the intestine and no gas stimulation; and group 3 (15 patients), intestinal clearing (diet, magnesium sulfate; enemas). The explosive range of the two gases investigated was reached at a concentration of approximately 4% by volume. In group 3, the gas concentrations were lower than 0.01% in group 1 and 2, however, levels above the "explosive threshold" were measured. The findings indicate that afte careful clearing of the intestine and avoidance of dietary stimulation of gas production, there is no risk of explosion during colonic electrosurgery.

1180 GRAY SCALE CHOLECYSTOSONOGRAPHY: AN EVALUATION OF ACCURACY. (Eng.) Arnon, S.; Rosenquist, C. J. (Univ. California Sch. Medicine, Davis, CA 95616). *Am. J. Roentgenol.* 127(5): 817-818; 1976.

The accuracy of gray scale cholecystosonography was evaluated by comparing oral cholecystography and ultrasonography findings in 141 patients. Confirmation of findings by oral cholecystography or surgery was available in 123 patients, and there was agreement by cholecystosonography in 111, for an accuracy of 90%. Of 39 patients with gallstones, 30 were correctly diagnosed by ultrasound. Of the nine false negative cholecystosonograms, six had suboptimal echographic visualization of the gallbladder. Excluding these six studies, the accuracy of ultrasonic detection of gallstones was 91%. The results represent an improvement in the accuracy of gray scale ultrasonography for evaluation of the gallbladder over previous reports and demonstrate the potential usefulness of this procedure for evaluation of the nonvisualized gallbladder.

1181 LAPAROSCOPY IN THE DIAGNOSIS OF HEPATIC TUMORS. (Cze.) Charousek, J.; Cihalik, C. (Vnitrni odd. Vojenske nemocnice, Olomouc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(8):541-546; 1975.

Of 67 patients with metastatic carcinoma to the liver, laparoscopy with directed liver biopsy established a correct diagnosis in 59 (88%). The diagnosis was falsely positive in three patients (4%), two of whom had macronodular cirrhosis and one of whom had focal fibrosis. Five patients (8%) showed false-negative results. In three of these, the metastases were not at all visible on the liver surface, and in two, the metastases were hidden under postsurgical adhesions. The diagnosis was correctly positive in 13 of 17 patients (76%) with primary hepatocellular carcinom and there were no false positives. Of the four patients (24%) giving false-negative results, tumors were deep in the liver tissue in two and grew infiltratively in the other two, the latter

ing cases of micro- and macronodular cirrhosis.
tastases were most often multiple and located in
th lobes (44 patients), while a solitary focus
infiltrative focal growth in only one lobe
s most often seen in hepatoma patients (10 cases).
e liver parenchyma showed signs of micronodular
rrhosis in 9 of the 13 hepatoma patients and
gns of macronodular cirrhosis in 2 patients.
paroscopy is thus of great significance in
e diagnosis of both secondary and primary
lignant tumors of the liver, and can completely
place exploratory laparotomy. Directed biopsy
a valuable supplement to endoscopic examinations.
though laparoscopic diagnosis of primary tumors
not as reliable as that of metastases, the tech-
ques are improving.

82 TECHNETIUM SCANS IN THE DETECTION OF GASTROINTESTINAL HEMORRHAGE. PREOPERATIVE
AGNOSIS OF ENTERIC DUPLICATION IN AN INFANT.

ng.) Wilson, J. P.; Wenzel, W. W.; Campbell, J. B.
resbyterian Medical Center, 1719 E. 19th Ave.,
nver, CO 80218). *JAMA* 237(3):265-266; 1977.

e case of a 3-month-old girl in whom enteric dupli-
tion of the colon causing gastrointestinal bleeding
s diagnosed by technetium scanning is presented.
e patient had a 6-week history of bright red rectal
eeding. The initial barium enema examination was
rmal. An abdominal scan after the i.v. injection
2 mCi of sodium pertechnetate ^{99m}Tc demonstrated
abnormal area of uptake in the left-upper quadrant
at appeared to be distinct from the stomach. Re-
at barium enema studies revealed irregularity of
e mucosa of the splenic flexure and filling of a
all diverticulum-like structure along the lateral
pect of the proximal descending colon. A 6 x 8-cm
plication cyst of the colon, to which a small
ount of ectopic pancreatic tissue was attached,
s removed at laparotomy. Radionuclide scanning of
e abdomen prior to routine contrast studies is
eful in the diagnosis of ectopic gastric mucosa as
source of gastrointestinal bleeding.

83 FACTOR VII AS A MARKER OF HEPATOCELLULAR SYNTHETIC FUNCTION IN LIVER DISEASE.

g.) Green, G.; Poller, L.; Thomson, J. M.;
bock, I. W. (Univ. Hosp. South Manchester, Eng-
d). *J. Clin. Pathol.* 29(11):971-975; 1976.

tor VII levels were measured in 100 patients with
er disease following parenteral vitamin K_1 ther-
, and the need for the determination of specific
tor VII in chronic liver disease was assessed.
re was good agreement between specific factor VII
surements and the one-stage prothrombin time,
ept for six patients with compensated cirrhosis
whom the prothrombin time was prolonged despite
presence of normal factor VII levels. A mean
ivity of 58% was found in patients with cirrhosis.
rhotic patients with features of hepatic decomp-
ation had a significantly lower mean level of
ivity (40%) than the "contrast" patients with
gical obstruction of the major bile ducts (93%).
ients with chronic active liver disease had mod-
te depression of factor VII levels and those with
noncirrhotic alcoholic liver damage had mean activities similar to those of the contrast group. Factor VII levels could not be correlated with BSP retention, but there was a correlation with serum albumin concentration. It is concluded that the prothrombin time, using the Quick test with a standardized thromboplastin showing good sensitivity to factor VII (e.g., the Manchester reagent), provides a reliable index of coagulability in chronic liver disease; specific factor VII assays are not indicated.

1184 THE ROLE OF METOCLOPRAMIDE IN PERORAL JEJUNAL BIOPSY: A CONTROLLED RANDOMIZED TRIAL.

(Eng.) Arvanitakis, C.; Gonzalez, G.; Rhodes, J. B. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Am. J. Dig. Dis.* 21(10):880-884; 1976.

The effect of metoclopramide on p.o. jejunal biopsy was examined in a controlled, double-blind, randomized trial, and particular emphasis was placed on whether the drug affects intubation time, fluoroscopy exposure time, ease of the procedure, or patient tolerance. Forty-nine patients who required jejunal biopsy for diagnostic purposes were admitted to the study. Twenty-four patients ranging in age from 18 to 67 yr received placebo (sodium metabisulfite, i.v.), and 25 patients from 16 to 73 yr old received metoclopramide (10 mg, i.v.) prior to the jejunal intubation. Intubation time to the ligament of Treitz in the placebo group was 22.3 ± 1.9 min versus 11.3 ± 1.4 min in the metoclopramide group ($p<0.001$). Fluoroscopy exposure time was 2.47 ± 0.25 in the placebo group versus 1.40 ± 0.12 min in the metoclopramide group ($p<0.001$). Subjective clinical evaluation of the operator's assessment of the procedure was based on a 0-4 scale (much easier=0, easier=1, average=2, harder=3, and much harder=4). Metoclopramide administration resulted in a significantly easier performance of the procedure ($p<0.001$), but did not influence patient tolerance. Three patients who received metoclopramide and one receiving placebo developed mild to moderate drowsiness of short duration. The results indicate that metoclopramide significantly shortens the time required for jejunal biopsy and reduces fluoroscopy exposure. Its regulatory action on gastrointestinal motility contributes to the easier performance of a valuable diagnostic procedure.

1185 USE OF DUODENAL DRAINAGE IN THE DIAGNOSIS OF ACALCULOUS GALLBLADDER DISEASE.

(Eng.) Smith, L. A.; Jagadish, B.; Anderson, H. M.; Stephenson, S. E. (Univ. Hosp., Jacksonville, Jacksonville, FL). *Am. Surg.* 42(12):893-898; 1976.

The reliability of duodenal drainage in diagnosing gallbladder disease was evaluated in 56 patients with normal acalculous oral cholecystograms and normal upper gastrointestinal studies. All patients had complaints of right upper quadrant or epigastric pain, postprandial nausea, vomiting, and flatulence. Duodenal drainage produced three bile fractions: common duct, gallbladder, and hepatic duct bile. Specimens with significant amounts of Ca bilirubinate or cholesterol crystals and bile-stained WBC were considered positive. Thirty-five patients had positive results, 32 with predominantly Ca bilirubinate crystals and 3 with predominantly cholesterol crystals; 17 had equivocal or suspicious results; and 4 had negative results. All patients underwent laparotomy and cholecystectomy. Microscopic examination showed diseased gallbladders in 35/35 positive patients, in 14/17 equivocal patients, and in 4/4 negative patients, indicating 4 false negatives. The findings were chronic cholecystitis (CC) in 25, CC with cholelithiasis in 10, CC with cholesterolosis in 5, cholesterolosis alone in 4, CC and superimposed acute cholecystitis in 3, mild CC in 6, and a normal gallbladder in 3. Excellent-to-good results were found in 96% at clinical follow-up. Duodenal drainage is concluded to be a safe, simple test that should be used as an adjunct to other procedures in diagnosing gallbladder disease.

1186 HEMOCCULT DETECTION OF FECAL OCCULT BLOOD QUANTITATED BY RADIOASSAY. (Eng.) Stroehlein, J. R.; Fairbanks, V. F.; McGill, D. B.; Go, V. L. W. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Am. J. Dig. Dis.* 21(10):841-844; 1976.

The results from the guaiac slide or Hemoccult (HO) test for fecal occult blood were compared with quantitative determinations of gastrointestinal loss after the i.v. administration of ^{51}Cr-labeled RBC in 80 patients. The subjects had no dietary restriction, and were referred because of clinical suspicion of gastrointestinal blood loss or complex anemia. A total of 555 stool specimens analyzed for ^{51}Cr loss were graded as negative, trace, or positive by the HO method. Of 338 specimens containing 0-2 ml/day by isotope assay, 7.4% were positive to the HO qualitative test. Loss of at least 10 ml/day in ^{51}Cr equivalent was necessary to assure that the majority of HO reactions would be positive. Of specimens containing more than 30 ml/day, 93% were positive. The ratio of ^{51}Cr-labeled RBC equivalents to stool volume and the percentage of positive HO reactions increased together. When this ratio exceeded 10%, two-thirds of the HO responses were positive. Further validation of the HO test and additional information concerning the factors that influence the sensitivity and reproducibility are necessary for the clinical application of the HO test for fecal occult blood.

1187 RADIO-ELECTROGASTRO-ENTEROGRAPHIC CORRELATIONS. (Fre.) Ecarlat, B.; Rouleau, P.; Moline, J.; Murat, J.; Martin, A. (Service de Radiologie "B", CHU Bretonneau, F 37000 Tours, France). *J. Radiol. Electrol. Med. Nucl.* 57(4):321-329; 1976.

1188 COMPUTER-AIDED DIAGNOSIS OF DYSPEPSIA: A PROSPECTIVE SERIES WITH EMPHASIS UPON COMPARISON WITH ENDOSCOPIC FINDINGS [Abstract]. (Eng.) De Dombal, F. T.; Horrocks, J. C.; McAdam, W. A.; Morgan, A. G.; Pacsoo, C.; Darnborough, A. (Airedale General Hosp., Steeton, Yorkshire, England). *Gut* 16(10):842; 1975.

1189 APPLICATION OF ELECTRONIC SPOT IMAGING (ESI) TO GASTROINTESTINAL ROENTGEN EXAMINATIONS. (Eng.) Short, W. F.; Sashin, D.; Porti, A.; Richman, L. S. (Memorial Hosp., Albany, NY 12204). *Am. J. Dig. Dis.* 21(5):399-401; 1976.

1190 A NEW SLENDER FIBERENDOSCOPE FOR UPPER GASTRO-INTESTINAL ENDOSCOPY (OLYMPUS MODEL
GIF TYPE P). PRELIMINARY REPORT [Abstract]. (Eng.)
Kruse, A. (Arhus Kommunehospital, Dept. Surgical Gastroenterology, Aarhus, Denmark). *Scand. J. Gastroenterol.* 10(34):48; 1975.

1191 ENDOSCOPY IN UPPER GASTROINTESTINAL TRACT
BLEEDING. (Eng.) Anselm, K.; Dwyer, R.
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See also, 1023, 1134, 1259, 1275, 1279, 1282, 1295, 1319, 1320, 1322, 1326, 1329, 1359, 1373, 1378, 1405, 1410, 1416, 1418, 1422, 1430, 1439, 1440, 1442, 1453, 1454, 1456, 1457, 1475, 1476, 1491, 1495, 1519, 1520, 1532, 1534, 1553, 1571, 1572, 1573, 1574, 1585, 1593, 1604, 1613, 1621, 1626, 1629, 1631, 1632, 1640, 1646, 1648, 1665, 1667, 1669, 1707, 1708, 1719, 1723.

GASTROINTESTINAL DISEASES

ESOPHAGUS

THE VALUE OF AZYGOGRAPHY IN CARCINOMA OF THE ESOPHAGUS.

(Eng.) Segarra, M. S.;
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). *Surg. Gynecol. Obstet.* 141(2):248-250;

genographic alterations in the posterior medi-
m in the presence of esophageal carcinoma were
ed by azygography. The possible correlations
en such changes and the degree of local invasion,
esectability, and the prognosis were also
ed. Twenty-six patients with esophageal car-
a prior to surgery, and seven controls under-
azygography under local anesthesia after treat-
with diazepam (10 mg, i.m.). The contrast
a was a water solution of iodamide mezglumine
l), injected through a trocar inserted into the
rib. Films were taken with the patient's
in light inspiration. A normal azygogram
een in 17 patients. All patients underwent
ry, and resection was carried out in 14. A
age or a reduction of the vein caliber at the
of growth was seen in eight patients, and resec-
was not possible. There was a direct correla-
between the azygogram, the degree of medi-
l invasion, and the possibility of exeresis
ese eight patients. In one patient in whom
age was detected at a distance from the primary
, resection was performed, since the image was
compression by a metastatic lymph node.
tion was possible in 13 of 17 patients with
l azygograms. Total blockage or progressive re-
on of venous caliber at the actual level of the
with contralateral filling of the azygos vein
k pressure signs on azygography contraindicates
ry, since resection of the growth is not pos-
.

INITIAL ACCURACY OF ESOPHAGOGRAMS IN DETECTION OF SMALL ESOPHAGEAL CARCINOMA.

Moss, A. A.; Koehler, R. E.; Margulis, A. R.
California Sch. Medicine, San Francisco,
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itial accuracy of radiographic diagnosis of
esophageal carcinomas was assessed, and those
es leading to false-negative and false-positive
retations were analyzed. Esophagograms of 35
ts were interpreted without knowledge of clini-
story by four diagnostic radiologists. Six
grams were of normal esophagi, 16 were of
s benign disorders, and 13 were examples of
(<3.5 cm) esophageal carcinomas. The overall
stic accuracy averaged 58%. Small esophageal
omas were initially diagnosed accurately in
cases. Of the 27% false-negative diagnoses,
e interpreted as normal and 21% as benign
alities. Esophageal lesions in the form of
tion surrounded by a mass were most often
sed correctly as carcinoma. The most common
was interpretation of esophagitis, stricture,
cerated benign lesions as carcinoma. Esopha-
hy was found to be a good screening procedure for detection of esophageal disease, but not for accurate diagnosis of small carcinomas.

1260 THE LOWER ESOPHAGEAL SPHINCTER AS A BARRIER TO GASTROESOPHAGEAL REFLUX.

(Eng.) Fisher, R. S.; Malmud, L. S.; Roberts, G. S.; Lobis, I. F. (Temple Univ. Health Sciences Center, 3401 North Broad St., Philadelphia, PA 19140). *Gastroenterology* 72(1):19-22; 1977.

To correlate lower esophageal sphincter (LES) pressure and gastroesophageal (GE) reflux, esophageal manometry and GE scintiscanning were used to study 40 consecutive patients. Serial scintiscanning was performed as the GE pressure gradient was incrementally increased. Reflux was calculated from the ratio of esophageal to gastric radioactivity. There was an inverse relation (r=-0.60, p<0.005) between GE reflux and LES pressure. Two subgroups of 10 patients were studied further. After atropine sulfate (1.2 mg, i.v.), LES pressure decreased from 11.2 ± 1.1 to 5.3 ± 0.9 mm Hg (p<0.01) at 20 min. The GE reflux index increased from 8.3 ± 2.1 to 13.4 ± 2.2% (p<.05). After bethanechol (5 mg, s.c.), LES pressure increased from 8.9 ± 0.8 to 18.5 ± 1.0 mm Hg (p<0.001) at 30 min. GE reflux decreased from 11.9 ± 2.4 to 5.8 ± 1.7% (p<0.01). GE reflux correlates with basal LES pressure by an inverse relationship. Atropine decreases LES pressure and increases reflux. Bethanechol increases LES pressure and decreases reflux. These data suggest that LES pressure is an important determinant of GE competence.

1261 EFFECT OF CIMETIDINE ON LOWER OESOPHAGEAL SHINCTER.

(Eng.) Bailey, R. J.; Sullivan, S. N.; Macdougall, B. R. D.; Williams, R. (King's Coll. Hosp., London, SE5 9R5, England). *Br. Med. J.* 2(6037):678; 1976.

To determine whether the ability of cimetidine to decrease bleeding in erosive esophagitis in fulminant hepatic failure is due to an increase in lower esophageal sphincter pressure (LESP), esophageal manometry was carried out in six normal subjects during the continuous i.v. infusion of cimetidine (150 mg). No significant difference was found at each 15-min interval for the control LESP and the LESP of infusion. However, when the values for each 15-min period were averaged, they were significantly different from the starting values. In the first 15 min, the control value fell below (p=0.0125) the starting value, while the LESP of infusion fell only slightly in five of six subjects. Cimetidine failed to cause a sustained increase in LESP, suggesting that it prevents bleeding erosive esophagitis by decreasing gastric acidity. It may have a biomedical effect in man on LESP by stimulation of the sphincter at low blood levels and a slight inhibition at high blood levels.

1262 INCIDENCE OF IRON DEFICIENCY ANEMIA IN PATIENTS WITH LARGE DIAPHRAGMATIC HERNIA. A CONTROLLED STUDY. (Eng.) Cameron, A. J. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 51(12): 767-769; 1976.

To investigate the relation between diaphragmatic hernia and anemia, the incidence of anemia in 259 patients with a diaphragmatic hernia large enough to be seen on a routine chest roentgenogram was compared with that in 259 age- and sex-matched controls. Eighteen patients with diaphragmatic hernia were anemic, compared to one control subject ($p<0.001$). In 13 patients with diaphragmatic hernia and in 1 control, the anemia was caused by iron deficiency. The findings provide additional evidence that a large diaphragmatic hernia can cause anemia secondary to chronic gastrointestinal blood loss, which is usually not the result of reflux esophagitis.

1263 PATTERNS OF GASTROESOPHAGEAL REFLUX IN HEALTH AND DISEASE. (Eng.) Demeester, T. R.; Johnson, L. F.; Joseph, G. J.; Toscano, M. S.; Hall, A. W.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Ann. Surg.* 184(4):459-470; 1976.

To quantitate gastroesophageal reflux in a near physiologic setting, 15 asymptomatic volunteers were studied with 24-hr pH and esophageal manometry. The normal cardia was more competent supine than in the upright position. Physiologic reflux was unaffected by age, rarely occurred during slumber, and was the rule after alimentation. One hundred symptomatic patients with an abnormal 24-hr pH record (2 standard deviations above the mean of controls) were divided into three patterns of pathological reflux: those who refluxed only in the upright position (9), only in the supine position (37), and in both positions (54). Upright differed from supine refluxers by excessive aerophagia causing reflux episodes by repetitive belching. Compared to controls, symptomatic patients had excessive postprandial reflux, lower distal esophageal sphincter (DES) pressure, and less DES exposed to the positive pressure of the abdomen. Supine differed from upright refluxers by having a higher incidence of esophagitis and an inability to clear the esophagus of acid after a supine reflux episode. Compared to controls, they had a lower DES pressure. Combined refluxers had a higher incidence of esophagitis than supine refluxers. Stricture (15%) was seen only in combined refluxers. They were similar to supine refluxers in their inability to clear a supine reflux episode. Compared to controls, combined refluxers had a lower DES pressure and less DES exposed to the positive pressure of the abdomen. Forty of the 100 patients had an antireflux procedure (4 upright, 8 supine, 28 combined). It is concluded that minimal reflux is physiological. In patients with only upright reflux, aerophagia and delayed gastric emptying may be an important etiologic factor.

1264 ESOPHAGEAL SPASM: CLINICAL AND MANOMETRIC RESPONSE TO NITROGLYCERINE AND LONG ACTING NITRITES. (Eng.) Swamy, N. (Veterans Admin. Hosp., Lake City, FL 32055). *Gastroenterology* 72(1):23-27; 1977.

The effect of nitroglycerine and long-acting nitrites on esophageal spasm was studied in 8 normal control subjects and 12 patients with esophageal spasm. The objective response of the esophagus to these drugs was recorded by obtaining esophageal manometric studies and was correlated with clinical response. In seven patients with significant gastroesophageal reflux associated with spasm, the response to nitroglycerine (1/150 grain) was unpredictable, but in five patients with diffuse esophageal spasm without gastroesophageal reflux, the response was uniformly good. All of the patients who responded to nitroglycerine also responded to long-acting nitrites (erythrityl tetranitrate and isosorbide dinitrate). These patients were placed on long-term management with long-acting nitrites; they remained symptom-free from 6 months to 4 yr. None had recurrence of symptoms on this therapy. The use of nitrites in controlling esophageal spasm is less effective in patients with gastroesophageal reflux than in patients without reflux. In the absence of reflux, long-term therapy with long-acting nitrites is effective in the management of diffuse esophageal spasm. Nitrites may also be beneficial as an adjunct to antireflux therapy.

1265 REFLUX CONTROL FOLLOWING EXTENDED MYOTOMY IN PRIMARY DISORDERED MOTOR ACTIVITY (DIFFUSE SPASM) OF THE ESOPHAGUS. (Eng.) Henderson, R. D.; Pearson, F. G. (Women's Coll. Hosp., 78 Grenville St., Toronto, Ontario, Canada). *Ann. Thorac. Surg.* 22(3):278-283; 1976.

To allow a more accurate assessment of extended myotomy, Belsey hiatal hernia repair, and gastroplasty for reflux control, 34 patients with primary disordered motor activity of the esophagus were surgically treated. Seventeen patients (group 1) had extended myotomy (6-10 cm above the aortic arch to the proximal 1 cm of stomach) and Belsey repair, and 17 (group 2) had myotomy, Belsey repair, and gastroplasty. Eight group 1 patients developed severe symptomatic reflux 6-27 months postsurgery, without evidence of hernia recurrence. In two patients, the reflux was controlled by medication; one patient was lost to follow-up, but continued to experience severe reflux; and five patients required gastroplasty. At 16-month follow-up after the second operation, none of the five showed clinical or roentgenographic evidence of reflux. None of the group 2 patients developed reflux symptoms. The final results in both groups were excellent in 28 patients, good in 5 patients, and poor in the one with the continued major reflux.

1266 PITFALLS IN THE PERFORMANCE AND INTERPRETATION OF ESOPHAGEAL FUNCTION TESTS. (Eng.) Clark, J.; Moossa, A. R.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, 950 East Fifty-Ninth St., Chicago, IL 60637). *Surg. Clin. North Am.* 56(1):29-37; 1976.

1267 TRACHEOESOPHAGEAL POUCH OCCURRING IN A CASE OF ESOPHAGEAL ATRESIA WITH DISTAL TRACHEOESOPHAGEAL FISTULA. (Eng.) Munda, R.; Drew, J.; Mersheimer, W. L. (No affiliation given). *J. Pediatr. Surg.* 11(1):111-112; 1976.

1268 PRIMARY MALIGNANT MELANOMA OF THE ESOPHAGUS. (Eng.) Kurzban, J. D.; Marshak, R. H.; Maklansky, D. (Mount Sinai Sch. Medicine, 1075 Park Ave., New York, NY 10028). *Am. J. Gastroenterol.* 65(5):464-465; 1976.

1269 HIATAL HERNIA REPAIR BY POSTERIOR GASTROPEXY. (Eng.) Marshall, R. D.; Gay, G. P. (24 Collins St., Melbourne, Victoria 3000, Australia). *Aust. N.Z. J. Surg.* 45(4):376-380; 1975.

1270 THE EVALUATION OF OBJECTIVE MEASUREMENTS OF GASTROESOPHAGEAL REFLUX AND THEIR CONTRIBUTION TO PATIENT MANAGEMENT. (Eng.) DeMeester, T. R.; Johnson, L. F. (Univ. Chicago Pritzker Sch. Medicine, 950 East Fifty-Ninth St., Chicago, IL 60637). *Surg. Clin. North Am.* 56(1):39-53; 1976.

1271 SPONTANEOUS RUPTURE OF THE ESOPHAGUS (BOERHAAVE SYNDROME). NECESSITY OF EARLY DIAGNOSIS AND TREATMENT. (Eng.) Campbell, T. C.; Andrews, J. L., Jr.; Neptune, W. B. (Dept. Internal Medicine, Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *JAMA* 235(5):526-528; 1976.

1272 GASTRIC PULL-UP OPERATION FOR REPLACEMENT OF THE CERVICAL PORTION OF THE ESOPHAGUS. (Eng.) Silver, C. E. (Montefiore Hosp., New York, NY). *Sug. Gynecol. Obstet.* 142(2):243-245; 1976.

1273 SYNCHRONOUS COMBINED ABDOMINO-THORACO-CERVICAL OESOPHAGECTOMY. (Eng.) Nanson, E. M. (Auckland Hosp., Park Rd., Auckland 3, New Zealand). *Aust. N.Z. J. Surg.* 45(4):340-348; 1975.

1274 REVIEW OF RECENT BOOKS: DISEASES OF THE ESOPHAGUS. (Eng.) Parker, E. F. (No affiliation given). *Ann. Thorac. Surg.* 211(1): 86-87; 1976.

1275 RADIOLOGICAL MANIFESTATIONS OF OESOPHAGEAL INVOLVEMENT IN ACANTHOSIS NIGRICANS. (Eng.) Itai, Y.; Kogure, T.; Okuyama, Y.; Akiyama, H. (Dept. Radiology, Geriatrics, Univ. Tokyo, Tokyo, Japan). *Br. J. Radiol.* 49(583):592-593; 1976.

1276 ANTICHOLINERGIC THERAPY FOR ACHALASIA. A CONTROLLED TRIAL [Abstract]. (Eng.) Fisher, R. S.; Lobis, I. F. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Clin. Res.* 23(5):577A; 1975.

1277 WHEN ESOPHAGEAL CARCINOMA IS OBSCURED BY OTHER FACTORS. (Eng.) Unger, J. L.; McGregor, D. H. (Univ. Kansas Medical Center, Coll. Health Sciences, Rainbow Blvd. at 39th, Kansas City, KS 66103). *Geriatrics* 31(2):53-58; 1976.

1278 PRIMARY GASTROINTESTINAL LYMPHOMA--A RE-EVALUATION. (Eng.) Henry, K.; Howarth, C.; Farrer-Brown, G. (Westminster Medical Sch., London SW1P 2PP, England). *IRCS Med. Sci.: Cancer* 4(4):159-160; 1976.

1279 DIAGNOSIS OF POSTEROLATERAL CONGENITAL DIAPHRAGMATIC (BOCHDALEK) HERNIA BY LIVER SCINTIGRAM: CASE REPORT. (Eng.) Yeung, W. C.; Haines, J. E.; Larson, S. M. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97207). *J. Nucl. Med.* 17(2): 110-112; 1976.

1280 CAUSTIC INGESTION AND SUBSEQUENT DAMAGE TO THE OROPHARYNGEAL AND DIGESTIVE PASSAGES. (Eng.) Kirsh, M. M.; Ritter, F. (Section Thoracic Surgery, Univ. Michigan, Medical Center, Ann Arbor, MI 48104). *Ann Thorac. Surg.* 21(1): 74-82; 1976.

See also, 0925, 0926, 0927, 1177, 1237, 1238, 1242, 1257, 1306, 1323, 1328, 1566, 1669.

STOMACH

1281 ACUTE GASTRIC MUCOSAL INJURY DURING CONTINUOUS OR INTERRUPTED ASPIRIN INGESTION IN HUMANS. (Eng.) Metzger, W. H.; McAdam, L.; Bluestone, R.; Guth, P. H. (Veterans Admin., Wadsworth Hosp. Center, Los Angeles, CA 90073). *Am. J. Dig. Dis.* 21(11):963-968; 1976.

The effect of continuous versus interrupted high-dose aspirin (ASA) administration for 14 days was evaluated in a randomized, double-blind study in eight patients with rheumatoid arthritis. Group I ingested aspirin (1.2-1.4 g, q.i.d.) for 14 consecutive days. Group II ingested an equal dose of aspirin for 10 days, placebo for 3 days, and aspirin again on day 14. Acute gastric mucosal injury was measured by histologic scoring of serial gastroscopy and gastric biopsy specimens. Significant gross mucosal damage was seen in all patients following 3 days of ASA ($p<0.01$), it persisted without significant change in severity to the end of the study. Histologic gastritis in areas free of hemorrhages and erosions was not increased significantly by ASA. In spite of gross mucosal injury, symptoms occurred infrequently. Serum pepsinogen I, but not serum gastrin, increased significantly following 3 days of ASA ($p<0.024$), and the elevation persisted to the end of the study. The mean levels of serum pepsinogen I were 159 and 147 ng/ml on days 3 and 15, resp., and only 103 ng/ml at the start of the study. The extent of mucosal injury at 14 days was not significantly different in those receiving ASA continuously from those on an interrupted schedule. Gastric mucosal adaptation to ASA in man was not demonstrated.

1282 GASTROINTESTINAL PLASMA PROTEIN LOSS DURING ETHANOL INGESTION. (Eng.)
Chowdhury, A. R.; Malmud, L. S.; Dinoso, V. P., Jr. (St. Joseph Hosp., 12th and Walnut St., Reading, PA 19603). *Gastroenterology* 72(1):37-40; 1977.

To determine the effect of ethanol ingestion on gastrointestinal protein loss, plasma and "equivalent" albumin loss in the feces were quantitated before and during ingestion of 40% ethanol using ^{51}Cr-labeled albumin. Five subjects were studied in each classification of normal gastric mucosa, superficial gastritis, and chronic atrophic gastritis. During the control period, plasma albumin loss was minimal and similar in all three groups. Exposure to ethanol resulted in a greater output of plasma albumin in the feces of all subjects. This loss was statistically significant in subjects with superficial gastritis ($p<0.01$) and chronic atrophic gastritis ($p<0.005$). Two subjects from each group underwent gastric clearance studies of ^{51}Cr-labeled albumin. Increased gastric clearance of plasma was observed in all six subjects during ethanol ingestion; the increase was highly significant in subjects with atrophic gastritis ($p<0.001$). Ethanol ingestion can cause increased loss of plasma protein in the feces, which may be of clinical significance in subjects with atrophic gastritis.

1283 CORRELATION OF HISTOLOGICAL PATTERNS OF PRIMARY GASTRIC LESIONS WITH AUTOPSY FINDINGS IN GASTRIC CARCINOMAS. (Jpn.) Nagatomo, T.; Murakami, E.; Mizuno, S.; Fujii, K. (Osaka Kosei Nenkin Hosp., Osaka, Japan). *Gan No Rinsho* 21(4):264-272; 1975.

Autopsies were performed on 123 gastric carcinoma patients, and the dominant spread of the tumor at death was determined. There were 39 curatively resected cases, 35 noncuratively resected cases, and 49 nonresected cases. The primary gastric lesions were divided into four types: localized (LOC), intermediate (INT), infiltrating (IFL: scirrhous, nonscirrhous), and muconodular (MCN). The grade of serosal rupture (s-factor), vascular invasion (v-factor), and lymph node metastasis (n-factor) was determined for each type. In LOC and INT lesions, the v-factor was predominant; hematogeneous organ metastases and lymph node metastases occurred extensively. In IFL and MCN lesions, the s-factor was predominant, and extensive peritonitis carcinomatosa occurred. The spread of the tumor and the type of recurrence did not depend on the type of resection, but correlated with the histological type of the primary gastric lesion.

1284 FAMILY PATTERNS OF ANTRO-FUNDAL GASTRITIS. (Eng.) Ihamaki, T.; Kekki, M.; Varis, K.; Siurala, M. (Meilahti Hosp., SF-Helsinki 29, Finland). *Acta Hepatogastroenterol. (Stuttg.)* 23(5): 345-350; 1976.

Family patterns of antrofundal gastritis in 311 first-degree relatives of 78 consecutive gastric carcinoma patients and 386 first-degree relatives of control probands computer-matched from a large Finnish population are reviewed. Blind and direct-vision gastric biopsies of the antrum and fundus were made, along with determinations of serum gastrin levels, circulating parietal cell antibodies, and pentagastrin secretion. Direct-vision biopsy of 288/386 control relatives showed that in 176, the state of the antral and fundal mucosa was similar (both normal or gastritic). Changes were predominant in the antral mucosa in 80 and in the fundal mucosa in 32 patients. Antral gastritis was associated with a normal fundal mucosa in only 13 patients, while the converse was true in only 18. There was a distinct accumulation of gastritis in some families, and the immunology, function, and histology of the stomach tended to be uniform within the family. Representative data are tabulated for three families. Both the A and B types of gastritis (Strickland and Mackay) and the AB type (Pitchumoni and Glass) were discernable in these series, particularly the A type, which is associated with high serum gastrin values and circulating parietal cell antibodies. The 386 controls were analyzed stochastically to obtain epidemiological evidence for the occurrence of A and B gastritis. There was a discernable A-gastritis line that deviated from the main population, but no clear-cut regression line representing B gastritis could be found.

1285 TREATMENT OF HEMORRHAGIC GASTRITIS BY ANTACID. (Eng.) Simonian, S. J.; Curtis, L. E. (Univ. Chicago Pritzker Sch. Medicine, 950 E. 59th St., Box 402, Chicago, IL 60637). *Ann. Surg.* 184(4):429-434; 1976.

A simple and safe method of nonsurgical treatment for the control of massive acute gastric mucosal hemorrhage is described. The treatment consists of complete neutralization of gastric acid with antacid to a pH of 7. The antacid is intermittently added and aspirated through a nasogastric ube to maintain the pH of the aspirate at 7. n a retrospective analysis, the hemorrhage was ontrolled in 44 of 49 patients (89%). Five atients who continued to bleed underwent surgery 10%); three had vagotomy and pyloroplasty, and neir bleeding ceased without recurrence. Two atients underwent partial gastrectomy, but ney developed recurrent bleeding and died. One atient whose bleeding has been controlled by agotomy and pyloroplasty died without hemorrhage 0 days after operation. Of the 44 patients nose bleeding was controlled by antacid, 11 ied without hemorrhage one or more weeks later. nese results of 89% control of hemorrhage compare avorably with those in the literature.

286 TRANEXAMIC ACID AND UPPER GASTROINTESTINAL HAEMORRHAGE--A DOUBLE-BLIND TRIAL.

Eng.) Biggs, J. C.; Hugh, T. B.; Dodds, A. J. St. Vincent's Hosp., Darlinghurst, N.S.W., ustralia). *Gut* 17(9):729-734; 1976.

he efficacy of antifibrinolytic therapy in the anagement of acute upper gastrointestinal emorrhage was investigated in a double-blind linical trial of 200 patients. Of these, 103 eceived antifibrinolytic therapy with tranexamic cid (amino-methylcyclohexane-carboxylic acid; g, i.v., + 1 g, p.o./8 hr for 48 hr, followed by g, p.o./8 hr for an additional 72 hr); the re- aining 97 patients received placebo only. The everity of initial blood loss, transfusion equirements, and incidences of recurrent bleeding, urgical intervention, and death were determined. he final diagnosis as to the site of bleeding as arrived at using endoscopy, barium studies, nd the findings at operation and autopsy. The roups were well matched as to severity of initial emorrhage, age, sex, etiological diagnosis, and recipitating factors. Twenty-three of 97 patients n the control group and 7 of 103 patients in the reatment group required surgery for the control f bleeding. There was reduction in the transfusion ate after the first 3 days of hospitalization n the treatment group. There were no significant ifferences in mortality or in side-effects etween the two groups. Further studies of the se of antifibrinolytic therapy in the control f gastrointestinal bleeding are warranted.

287 PROGNOSIS OF GASTRIC ULCER: TWENTY-FIVE YEAR FOLLOWUP.

(Eng.) Kraus, M.; endeloff, G.; Condon, R. E. (Wood Veterans Admin. osp., Milwaukee, WI 53193). *Ann. Surg.* 184(4): 71-476; 1976.

our hundred twenty-two patients with gastric ulcer reated during 1950-1960 were followed up to 25 yr mean follow-up, 9 yr) to assess the results of perative and nonoperative treatment and to appre- iate the propensity of gastric ulcers to recur. onoperative treatment was used in 59%, with a ospital mortality of 35%; one-third of these eaths was directly due to gastric ulcer perforation r hemorrhage. Operative treatment was used in 1% of patients. The most common operation was gastric resection without vagotomy, which was used in 86% of the cases. Overall operative mortality was 16%--34% for emergency procedures and 6% for elective procedures. Cachexia was the most important factor in operative mortality. Nonoperative treatment resulted in more than twice the hospital mortality as operative treatment. Approximately one-half of all patients treated nonoperatively had a recurrent gastric ulcer at some time during this study. The recurrence rate following definitive gastric resection was 1.3%, compared with 16% during nonoperative therapy. Three-fourths of recurrences occurred later than 2 yr, and nearly half of recurrences occurred after more than 5 yr of follow-up. Patients with a prior history of overt bleeding from gastric ulcer disease were particularly at risk for furthur bleeding. There were coincidental duodenal ulcers in 10% of the patients and there was an 0.8% incidence of gastric cancer during follow-up. Earlier elective operation in patients with overt bleeding, recurrence, or persisting symptoms should decrease overall mortality and result in a lower overall long-term risk of ulcer complications.

1288 DELAYED GASTRIC EMPTYING FOLLOWING GASTRECTOMY.

(Eng.) Cohen, A. M.; Ottinger, L. W. (Cox Building, Floor 1, Massachusetts General Hosp., Boston, MA 02114). *Ann. Surg.* 184(6):689-696; 1976.

Experience with 46 patients who were unable to take a solid diet within 2 weeks of gastric resection but had no other postoperative complications is reviewed. Five patients had undergone partial distal gastrectomy, 11 had undergone subtotal gastrectomy, and the remaining 30 had had a hemigastrectomy and truncal vagotomy. The incidence of delayed gastric emptying was found to be 2.5 times greater in patients with vagotomy and hemigastrectomy than in those with subtotal gastrectomy. In addition, postoperative delay was often prolonged in the hemigastrectomy and vagotomy group. Mechanical factors were responsible for delay in only 10% of these patients. It is suggested that localized starch peritonitis may explain many cases of "functional efferent limb ileus." Conservative management for the majority of patients is recommended. Reoperation is reserved for those who require feeding or draining enterostomy tubes and for those whose clinical course and evaluation suggest obstruction.

1289 THE PATHOGENESIS AND THERAPY OF THE POSTVAGOTOMY SYNDROME.

(Eng.) Stremmel, W. (Dept. Surgery, Univ. Freiburg, Freiburg, W. Germany). *Chir. Gastroenterol.* 10(2):159-163; 1976.

Experience with six cases of postvagotomy syndrome is reported. Two patients had severe diarrhea, and four had a moderate form. It was assumed that the diarrhea was chologenic, as previous studies have indicated, that after vagotomy, the incidence of gallstones is increased and bile composition is altered. Cholestyramine (4 g, t.i.d) eliminated the diarrhetic stools within 2-3 days, at which time the dosage was reduced (4 g/day). Steatorrhea was not observed under this therapy, but if it should occur, fat, in the form of middle-chained triglycerides, is recommended. Two other factors are postulated for the appearance of diarrhea: the increase of bacteria in the small bowel and the diminished resorption of bile acids in the terminal ileum. In addition, after vagotomy, the fasting gastrin level is markedly increased. This results in stimulation of colon motility and inhibition of bile acid resorption in the terminal ileum. Gastrin also diminishes the tonus in the ileocecal valve, making bacterial settling from the colon into the terminal ileum possible.

1290 DETECTION OF VOLATILE SOLVENTS IN GASTRIC CONTENTS BY GAS PHASE INFRARED SPECTROPHOTOMETRY. (Eng.) Fastlich, E. (Dept. Health, Public Health Lab., 455 First Ave., New York, NY 10016). *J. Assoc. Off. Anal. Chem.* 59(1):130-133; 1976.

1291 GASTRIC MUCOSAL CONTRACTION. (Eng.) Rosin, R. D.; Exarchakos, G.; Ellis, H. (Westminster Hosp., London SW1, England). *Surgery* 79(5):560-563; 1976.

1292 TRIAL AND ERROR IN GASTRIC SURGERY. (Eng.) Desmond, A. M. (St. James' Hosp., London SW12 8HW, England). *Proc. R. Soc. Med.* 69(4):257-262; 1976.

1293 AN EXPERIMENTAL STUDY OF GASTRIC HEALING FOLLOWING SCALPEL AND DIATHERMY INCISIONS. (Eng.) Rosin, R. D.; Exarchakos, G.; Ellis, H. (Westminster Hosp., London, S.W.1., England). *Surgery* 79(5):555-559; 1976.

1294 PROBLEMS IN ABDOMINAL SURGERY: II. POSTOPERATIVE REFLUX GASTRITIS. (Eng.) Barnett, W. O. (Univ. Mississippi Medical Center, 2500 N. State St., Jackson, MS 39216). *J. Miss. State Med. Assoc.* 17(3):67-69; 1976.

1295 NEAR-FATAL HEMORRHAGE FOLLOWING GASTROGRAFIN STUDIES. (Eng.) Gallitano, A. L.; Kondi, E. S.; Phillips, E.; Ferris, E. (Boston Univ. Medical Center, Boston, MA 02118). *Radiology* 118(1):35-36; 1976.

1296 PREMEDICANT DRUGS AND GASTRIC JUICE pH AND VOLUME IN PEDIATRIC PATIENTS. (Eng.) Salem, M. R.; Wong, A. Y.; Mani, M.; Bennett, E. J.; Toyama, T. (Cook County Hosp., Chicago, IL). *Anesthesiology* 44(3):216-219; 1976.

1297 REVIEW OF FIVE CASES OF EARLY GASTRIC CARCINOMA. (Eng.) Fevre, D. I.; Green, P. H. R.; Barratt, P. J.; Nagy, G. S. (Royal North Shore Hosp., Sydney, N.S.W., Australia). *Gut* 17(1):41-47; 1976.

1298 AN ULTRASTRUCTURAL STUDY ON PRECANCEROUS AND CANCEROUS LESIONS OF THE GLANDULAR STOMACH IN RATS INDUCED BY N-METHYL-N'-NITRO-N-NITROSOGUANIDINE. (Eng.) Tahara, E.; Haizuka, S.; Tokuoka, S. (Dept. Pathology, Hiroshima Univ. Sch. Medicine, 1-2-3 Kasumi, Hiroshima, Japan). *Acta Pathol. Jpn.* 26(1):1-15; 1976.

1299 END RESULT OF THE SURGICAL TREATMENT FOR ADVANCED STOMACH CARCINOMA. (Eng.) Miwa, K. (Dept. Surgery, Natl. Cancer Center Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 10(3):225; 1975.

1300 MENETRIER'S DISEASE AND CARCINOMA OF STOMACH. (Eng.) Stamatakis, J. D. (King's Coll. Hosp., London SE5 8RX, England). *Proc. R. Soc. Med.* 69(4):264-265; 1976.

1301 HAMARTOMA OF THE STOMACH IN CHILDHOOD: CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Bogomoletz, W. V.; Cox, J. N. (Queen Mary's Hosp., Roehampton, London, SW15-5PN, England). *Virchows Arch.* [*Pathol. Anat.*] 369(1):69-79; 1975.

1302 CLINICAL AND THERAPEUTIC APPLICATIONS OF A NEW PATHOGENETIC THEORY ON THE DUMPING SYNDROME. (Eng.) Berti Riboli, E.; Mortola, G. P.; Reboa, G.; Anfossi, A.; Pandolfo, N. (Ospedale S. Martino, Genova 16132, Italy). *Int. Surg.* 61(4):212-215; 1976.

1303 ASSESSMENT OF THE DUMPING SYNDROME: PREVENTION AND CORRECTION. (Eng.) Frankel, L. A. (St. Luke's & Children's Medical Center, Philadelphia, PA 19122). *Int. Surg.* 61(4):216; 1976.

1304 DIAPHRAGMATIC HERNIA OF THE STOMACH IN A PERUVIAN MUMMY. (Eng.) Gerszten, E.; Munizaga, J.; Allison, M. J.; Klurfeld, D. M. (Medical Coll. Virginia, Virginia Commonwealth Univ., Richmond, VA). *Bull. N.Y. Acad. Med.* 52(5):601-604; 1976.

1305 PREPYLORIC MUCOSAL DIAPHRAGM. (Eng.) Rona, A.; Sylvestre, J. (Queen Mary Veteran's Hosp., Montreal, Canada). *J. Can. Assoc. Radiol.* 26(4):291-294; 1976.

1306 INTRATHORACIC STOMACH: WHEN DOES IT OBSTRUCT? (Eng.) Gerson, D. E.; Lewicki, A. M. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *Radiology* 119(2):257-264; 1976.

1307 STUDIES ON THE EFFECT OF SMALL BOWEL BYPASS FOR MASSIVE OBESITY ON GASTRIC SECRETORY FUNCTION. (Eng.) Wise, L.; Vaughan, R.; Stein, T. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Ann. Surg.* 183(3):259-262; 1976.

1308 GASTRIC BYPASS. (Eng.) Hornberger, H. R. (Mid-Maine Medical Center, Waterville, ME 04901). *Am. J. Surg.* 131(4):415-418; 1976.

1309 ENTERIC-COATED ASPIRIN OVERDOSE AND GASTRIC PERFORATION [Letter to Editor]. (Eng.) Gumpel, J. M. (Northwick Park Hosp., Harrow, Middlesex, England). *Br. Med. J.* 4(5997):648; 1975.

1310 INFANTILE HYPERTROPHIC PYLORIC STENOSIS RELATED TO INGESTION OF ERYTHROMYCINE ESTOLATE: A REPORT OF FIVE CASES. (Eng.) San-Filippo, J. A. (New York Medical Coll., 1249 5th Ave., New York, NY 10029). *J. Pediatr. Surg.* 11(2): 177-180; 1976.

1311 ISCHAEMIC ULCERS OF THE STOMACH [Abstract]. (Eng.) Samuel, E. (Univ. Edinburgh, Edinburgh, Scotland). *Br. J. Radiol.* 48(575):942-943; 1975.

1312 THE PREVENTION OF STRESS ULCERS BY METIAMIDE, AN H_2-RECEPTOR ANTAGONIST. (Eng.) Bodily, K.; Fischer, R. P. (Saint Paul-Ramsey Hosp., Saint Paul, MN 55101). *J. Surg. Res.* 20(3):203-209; 1976.

1313 THE PREVENTION OF ULCERS IN THE PYLORUS-LIGATED RAT BY INTRAVENOUS PLURONIC F-68. (Eng.) Wahl, R.; Butterfield, W. C. (Univ. Connecticut Health Center, Farmington, CT 06032). *J. Surg. Res.* 20(1):45-47; 1976.

1314 CHANGES IN VASCULAR PERMEABILITY ASSOCIATED WITH ACETIC ACID-INDUCED GASTRIC ULCER IN RATS. (Eng.) Molster, A.; Svanes, K.; Tonjum, S. (Univ. Bergen Sch. Medicine, Haukeland Hosp., N-5000 Bergen, Norway). *Eur. Surg. Res.* 8(1):39-50; 1976.

1315 ELECTRON MICROSCOPIC STUDY OF THE REPAIR OF ASPIRIN-INDUCED GASTRIC EROSIONS. (Eng.) Yeomans, N. D. (Monash Univ., Dept. Medicine, Alfred Hosp., Melbourne, 3181, Australia). *Am. J. Dig. Dis.* 21(7):533-541; 1976.

1316 CLOFIBRATE: ANTISECRETORY-ANTIULCER ACTIVITY IN THE RAT. (Eng.) Lippmann, W.; Seethaler, K. (Biochemical Pharmacology Dept., Ayerst Res. Lab., P.O. Box 6115, Montreal, Quebec, Canada). *J. Pharm. Pharmacol.* 28(2):165-166; 1976.

1317 STRESS AND THE ACUTE GASTRIC MUCOSAL LESION. (Eng.) Moody, F. G.; Cheung, L. Y.; Simons, M. A.; Zalewsky, C. (Univ. Utah Sch. Medicine, Salt Lake City, UT 84112). *Am. J. Dig. Dis.* 21(2): 148-154; 1976.

1318 GASTRIC MUCOSAL PERMEABILITY IN BURNED PATIENTS: CORRELATION WITH ENDOSCOPY. (Eng.) Rai, K.; Courtemanche, A. D.; Cohen, M. M. (Vancouver General Hosp., Vancouver, B.C., Canada). *J. Surg. Res.* 20(2):71-75; 1976.

1319 THE RADIOLOGICAL DEMONSTRATION OF THE SURFACE PATTERN OF THE STOMACH [Abstract]. (Eng.) Kreel, L. (Northwick Park Hosp., Harrow, Middlesex, England). *Br. J. Radiol.* 48(575):942; 1975.

1320 TESTS OF GASTRIC FUNCTION AFTER GASTRIC SURGERY. (Eng.) Read, R. C.; Hall, W. H. (Veterans Admin. Hosp., 300 East Roosevelt Road, Little Rock, AR 72206). *Primary Care* 2(3):477-485; 1975.

1321 RADIOLOGICAL AND CLINICAL ASPECTS OF RESECTION OF THE CARDIA. (Ger.) Rehner, M.; Wehling, H.; Soehendra, N.; Eckert, P. (Chirurgische Universitatsklinik Hamburg, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Fortschr. Roentgenstr.* 122(2):160-164; 1975.

1322 IDIOPATHIC GASTRIC ABSCESS. A BIZARRE INTRAMURAL LESION. (Eng.) Weiner, C. I.; Kumpe, D. A.; Diaconis, J. N. (Univ. Maryland Hosp., 22 S. Green St., Baltimore, MD 21201). *Am. J. Gastroenterol.* 64(6):452-459; 1975.

1323 CHEMOTHERAPY OF GASTROINTESTINAL CANCER. (Eng.) Regelson, W. (Virginia Commonwealth Univ./Medical Coll. of Virginia, Richmond, VA). *Int. J. Radiat. Oncol. Biol. Phys.* 1(1/2):109-117; 1975.

1324 BIOSYNTHESIS OF SOLUBLE PROTEINS AND PEPSINOGEN OF THE MUCOUS MEMBRANE AND CANCER OF THE HUMAN STOMACH. (Rus.) Kalinovskii, V. P.; Parshin, A. N. (N. N. Petrov Res. Inst. Oncology, USSR Ministry Health, Leningrad, USSR). *Vopr. Onkol.* 21(9):31-36; 1975.

1325 NEUROMAS AND MYOMAS OF THE STOMACH. (Ger.) Koppenfels, R. V. (Radiologische Klinik, Univ. Munster, Jungeblodtplatz 1, 44 Munster/Westf., W. Germany). *Fortschr. Roentgenstr.* 122(2):164-166; 1975.

1326 THE SYMPTOMATIC SIGNIFICANCE OF GASTRITIS AND ENDOSCOPIC HYPERAEMIA FOLLOWING GASTRIC OPERATIONS [Abstract]. (Eng.) Hoare, A. M.; Jones, E. L.; Alexander-Williams, J.; Hawkins, C. (Queen Elizabeth Hosp., Birmingham, England). *Gut* 17(5):396; 1976.

1327 IMMUNE PHENOMENA IN CHRONIC GASTRITIS, COINCIDENTAL OR PATHOGENETIC? (Ger.) Fixa, B.; Komarkova, O. (II. Medizinische Universitatsklinik, CS-500 36 Hradec Kralove, Czechoslovakia). *Leber Magen Darm* 5(4):162-166; 1975.

1328 GASTROINTESTINAL HEMORRHAGE SECONDARY TO CYTOMEGALOVIRUS AFTER RENAL TRANSPLANTATION. A CASE REPORT AND REVIEW OF THE PROBLEM. (Eng.) Diethelm, A. G.; Gore, I.; Ch'ien, L. T.; Sterling, W. A.; Morgan, J. M. (Univ. Alabama Medical Center, University Station, Birmingham, AL 35294). *Am. J. Surg.* 131(3):371-374; 1976.

1329 MALLORY-WEISS SYNDROME--REVISITED. (Eng.) Ansari, A. (Metropolitan Medical Center, Suite M04, 825 S. Eighth St., Minneapolis, MN 55404). *Am. J. Gastroenterol.* 64(6):460-466; 1975.

1330 GASTRIC PSEUDOLYMPHOMA. A SPECTRUM OF PRESENTING FEATURES AND DIAGNOSTIC CONSIDERATIONS. (Eng.) Perrillo, R. P.; Tedesco, F. J. (Univ. Miami Sch. Medicine, P.O.B. 520875, Biscayne Annex, Miami, FL 33152). *Am. J. Gastroenterol.* 65(3):226-230; 1976.

1331 DOUBLE PYLORUS WITH ANTRAL DIAPHRAGM. (Eng.) Wilberg, S. (Krankenhaus Bethanien, 46 Dortmund-Horde, Virchowstrasse 4, W. Germany). *Endoscopy* 7(1):44-45; 1975.

1332 A SECRETORY AND HISTOLOGICAL STUDY OF THE STOMACH BEFORE AND AFTER TRUNCAL VAGOTOMY AND PYLOROPLASTY IN DUODENAL ULCER PATIENTS. (Eng.) Roland, M. (Aker Univ. Hosp., Oslo 5, Norway). *Scand. J. Gastroenterol.* 11(1):65-71; 1976.

See also, 0978, 0979, 0980, 1117, 1137, 1141, 1144, 1147, 1149, 1150, 1151, 1152, 1154, 1177, 1188, 1189, 1191, 1234, 1235, 1238, 1241, 1242, 1251, 1257, 1258, 1260, 1263, 1270, 1280, 1340, 1344, 1349, 1350, 1355, 1370, 1375, 1443, 1498, 1551, 1628, 1648, 1665, 1705.

STOMACH

Peptic Ulcers

1333 DUODENO-GASTRIC REFLUX IN GASTRIC ULCER PATIENTS IN RELATION TO INTESTINAL METAPLASIA OF THE GASTRIC MUCOSA. (Eng.) Tympner, F.; Domschke, W.; Demling, L. (Medizinische Klinik mit Poliklinik der Universitat Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):360-364; 1976.

Duodenal regurgitation in 13 gastric ulcer patients and 14 healthy controls was determined quantitatively. Using vitamin B_{12} labeled with Co^{58} as an exogenous marker and bilirubin as an endogenous marker, the duodenogastric reflux was determined under basal conditions and during stimulation (1 clinical U secretin/kg + 1 clinical U pancreozymin/kg) of the exocrine pancreas. In addition, histologic examination of the gastric mucosa was carried out by taking multiple biopsies from along the greater and lesser curvatures of the stomach. In the controls, a duodeno-gastric reflux accounting for 1% of the gastric aspirate was observed in the basal phase; there was only a 1% duodenal reflux during stimulation without aspiration of the duodenal contents and a 2.5% reflux during stimulation with aspiration. In the gastric ulcer patients, the corresponding figures were 4.5%, 9.5%, and 9.2%. However, increased reflux was found only in those ulcer patients presenting with an antral metaplasia. No statistically significant increase in duodeno-gastric reflux can be verified under secretin/pancreozymin stimulation of the pancreas.

1334 ANTRAL GASTRIN REGULATION. (Eng.) Levine, B. A.; Greenburg, A. G.; Peskin, G. W.; Saik, R. P. (Veterans Hosp., San Diego, CA 92161). *J. Surg. Res.* 20(6):509-514; 1976.

The effect of pH alone and with a protein meal on gastrin release was studied in patients with duodenal ulcer, normal subjects, and in dogs. In one series, 12 patients (6 normal and 6 with ulcer) were fed a 180-g protein meal; in a second series of 18 normal subjects and 12 ulcer patients, the antral stimulant was pH buffered saline (0.1 N HCl and 0.1 N $NaHCO_3$). In dogs, antral pH was varied from acid to alkaline and alkaline to acid with solutions of HCl and $NaHCO_3$. The mean fasting serum gastrin levels were similar in normal and duodenal ulcer patients (142 ± 50 and 128 ± 38 pg/ml, resp.), while the integrated gastrin output following a protein meal was significantly greater ($p<0.005$) in the duodenal ulcer patients. Intragastric pH did not correlate with any significant changes in peripheral serum gastrin in either normal or ulcer patients. Normal subjects demonstrated some acid inhibition by regression curve analysis. Significant differences could not be appreciated if the antrum was topically perfused from low pH (1) to high pH (8) or from high to low pH. On 17 of 28 occasions, acid inhibition was noted in normal subjects, but there was a decrease in gastrin ($p=0.043$) in only 5 of 15 occasions in the ulcer group. In the animal experiments, o differences in serum gastrin levels to either ne acid or alkaline antral challenge were evident n the acute dog model, sampling from an antral vein 182 versus 170 pg/ml) or in the chronic dogs, ampling peripherally (82 versus 91 pg/ml). This tudy supports the concept that gastrin release ollowing a protein meal is significantly elevated n duodenal ulcer patients, despite lack of signifi-ant differences in basal levels.

335 THE PLACE OF GASTRIN DETERMINATION IN ULCER SURGERY. (Eng.) Sauberli, H. (Kantonsspi-al, CH-8091 Zurich, Switzerland). *Eur. Surg. Res.* (4):269-280; 1976.

he place of gastrin determination in ulcer surgery as studied in 50 duodenal ulcer patients. The role f the vagus in the gastrin response to a test meal as studied before and 3, 6, and 12 months after ighly selective vagotomy (HSV) with and without angensteen-pyloroplasty (25 patients each). Basal nd stimulated gastrin concentrations in serum, as etermined by radioimmunoassay, were elevated 3 onths after the operation, and 3 hr after the test eal, gastrin levels were still 50% higher than the asal levels. No difference was found between the atients treated with HSV alone and those treated ith HSV and additional pyloroplasty. Six and twelve onths after the operation, a moderate decrease of astrin secretion was observed, but basal and stim-lated gastrin levels were still elevated after 12 onths, compared to the values before operation. The esults indicate that the pattern of gastrin secre-ion changes as time passes after highly selective agotomy with or without additional pyloroplasty.

336 EFFECT OF GRADED AMOUNTS OF ACID INSTILLED INTO THE DUODENUM ON PANCREATIC BICARBONATE ECRETION AND PLASMA SECRETIN IN DUODENAL ULCER ATIENTS AND NORMAL SUBJECTS. (Eng:) Isenberg, . I.; Cano, R.; Bloom, S. R. (Veterans Admin. adsworth Hosp. Center, Los Angeles, CA 90073). *astroenterology* 72(1):6-8; 1977.

ecause impaired secretin release and/or bicarbonate ecretion in response to duodenal acidification ould contribute to the lower duodenal pH seen in uodenal ulcer patients, pancreatic bicarbonate ecretion and plasma secretin were measured n response to graded amounts of HCl (0.94, .88, 3.75, and 7.5 mEq/5 min) instilled di-ectly into the duodenum in nine duodenal ulcer atients and in nine normal subjects. These graded mounts of acid produced graded increases in ancreatic bicarbonate in both groups. Mean icarbonate secretion was significantly greater n the duodenal ulcer patients than in the normal ubjects basally and after the lowest dose f HCl. The mean peak 30-min bicarbonate out-ut after duodenal acidification was 3.0 ± 1.0 Eq in the duodenal ulcer patients and 2.1 ± 0.6 Eq in the normal subjects ($p<0.5$). A significant $p<0.05$) increase in plasma secretin occurred after uodenal acidification, but the increase in the uodenal ulcer and normal subjects was not significantly different ($p>0.2$). These results indicate that pancreatic bicarbonate secretion and the increase in plasma secretin in response to graded amounts of duodenal acid are at least as great in patients with duodenal ulcer as in normal subjects.

1337 RESPONSE TO JEJUNAL ACIDIFICATION IN MAN. II. PANCREATIC, BILIARY AND GASTRIC RESPONSES. (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Scand. J. Gastroenterol.* 11(5):505-512; 1976.

Eight control subjects and 10 patients with duodenal ulcer underwent jejunal perfusion with a 0.05 M HCl solution (8.3 ml/min for 150 min), and the effects on bicarbonate (BC), trypsin (T), and bile pigment (BP) secretion into the duodenum were determined. During the final 75 min of acid perfusion, five controls and six patients also underwent i.v. infusion of cholecystokinin-pancreozymin and secretin (CCK/S). The outputs of BC, T, and BP in response to acid perfusion were similar in patients and controls, but there was a trend for the patients to secrete less BC than normal. After combined acid/CCK/S, the outputs of BC and BP remained similar in both groups, but the output of T was significantly greater in the patients ($p<0.05$) than in controls. The output of BC was significantly greater ($p<0.05$) in controls in response to CCK/S alone and to acid/CCK/S than in patients. In contrast, the output of T was significantly greater ($p<0.05$) in the patients in response to acid/CCK/S, but it was significantly less ($p<0.05$) in response to CCK/S. BP output with either stimulus did not differ significantly between controls and patients. There was a significant negative correlation ($p<0.001$) between the disappearance of acid from the jejunal luminal contents and the secretion of BC and T into the duodenum. The pancreatic response to acid in the duodenum was concluded to depend on exposure of the jejunal mucosa to amounts of acid that are higher than threshold in all subjects. The patients differed from controls in that they lacked an acid-released jejunal inhibitor of T secretion by the pancreas.

1338 MUCOSAL GASTRIN CONCENTRATION, MOLECULAR FORMS OF GASTRIN, NUMBER AND ULTRASTRUCTURE OF G-CELLS IN PATIENTS WITH DUODENAL ULCER. (Eng.) Creutzfeldt, W.; Arnold, R.; Creutzfeldt, C.; Track, N. S. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Gut* 17(10):745-754; 1976.

The immunoreactive gastrin (IRG) concentration, the molecular forms of IRG, and the number and ultrastructural appearance of G-cells in the antral and duodenal bulb mucosa of patients with duodenal ulcer (DU) and controls were studied. The mean antral IRG concentration of 38 DU patients was significantly higher (35.9 ± 5.2 µg/g) than that of 21 controls (15.9 ± 2.6 µg/g). The mean IRG concentration in the proximal duodenal mucosa of 15 DU patients (3.2 ± 0.8 µg/g) was not significantly higher than that of 10 controls (1.8 ± 0.5 µg/g). The number of G-cells in the antral mucosa of 58 DU patients and in the duodenal mucosa of 29 DU patients was similar to that of controls.

The distribution of immunoreactivity in gastrin components was investigated in the antral and duodenal mucosa of six DU patients and six controls. In the antral mucosa, the mean percentage of G-17 was 93.3% in DU patients and 92.0% in controls. G-34 amounted to 4.0% in DU patients and to 5.0% in controls. The G-34 percentage in the duodenal mucosa was not significantly higher in the DU patients than in the controls (50.1% versus 35.8%). Ultrastructurally, the antral G-cells of DU patients had a significantly lower density index of their secretory granules (1.43 ± 0.03 versus 2.52 ± 0.14), suggesting higher functional activity. It is concluded that the exaggerated serum IRG response of DU patients to different stimuli is not a consequence of an increased G-cell mass.

1339 EFFECT OF METIAMIDE ON BASAL AND STIMULATED SERUM CHOLECYSTOKININ LEVELS IN DUODENAL ULCER PATIENTS.

(Eng.) Spence, R. W.; Celestin, L. R.; Harvey, R. F. (Frenchay Hosp., Bristol, England). *Gut* 17(11):920-923; 1976.

To study the effect of decreasing endogenous gastric acid secretion on serum cholecystokinin (CCK) levels, CCK levels were measured in 10 patients with chronic duodenal ulcers, fasting and at intervals after two standard test meals (300 ml of 40 mM phenylalanine solution). One meal was given before and one during H_2-receptor blockade with metiamide (200 mg, q.i.d.). Fasting serum CCK levels were lower in all patients during treatment with metiamide, the mean level falling from 306.0 ± 102.0 to 82.1 ± 23.6 pg/ml after treatment ($p<0.01$). In contrast, peak serum CCK levels after the meal were not significantly different (7,400 ± 1,141 pg/ml before treatment and 7,569 ± 1,293 pg/ml on metiamide). In duodenal ulcer patients, CCK secretion under basal conditions may be, in part, dependent on stimulation of the small intestinal mucosa by gastric acid, but after an amino acid meal, gastric acid secretion is less important in determining the amount of CCK released.

1340 A COMPARISON OF THE ACID AND GASTRIN SECRETORY RESPONSES TO HYPOGLYCAEMIA AND MEALS IN DUODENAL ULCER WITH AND WITHOUT ACID HYPERSECRETION TO PENTAGASTRIN.

(Eng.) Lam, S. K.; Sircus, W. (Western General Hosp., Edinburgh, EH4 2XU Scotland). *Digestion* 14(1):1-11; 1976.

The functioning cell masses of gastrin cells (G cells) and parietal cells in two duodenal ulcer (DU) groups were compared by examining the responses to hypoglycemia-induced vagal stimulation and to standard test meals. In 60 uncomplicated DU patients, maximum acid output (MAO) after injection of 0.6 μg pentagastrin and acid output following insulin-induced hypoglycemia (IAO; 0.2 U/kg) were measured, and in 30 patients, serum gastrin responses to insulin and to standard meals were also measured. Among the 60 patients, there were 36 normosecretors with an MAO of ≤ 0.50 mmol/kg and 24 hypersecretors with an MAO ≥ 0.50 mmol/kg. The mean IAO in the hour following the insulin injection was significantly higher in the hypersecretors (20.2 ± 1.7 mmol/hr) than in the normosecretors (16.3 ± 1.1 mmol/hr) and the normal subjects (10.4 ± 1.7 mmol/hr, $p<0.025$ and 0.0025, resp.). There was a significant correlation between IAO and MAO in the normal subjects ($p<0.01$) and normosecretors ($p<0.001$), but not in the hypersecretors. In normosecretors, the serum gastrin levels at 40-120 min were significantly higher than those of hypersecretors and normal subjects. The integrated gastric response was significantly higher in normosecretors than in hypersecretors and normal subjects ($p<0.025$ and 0.01, resp.). The IAO:MA ratio was significantly correlated in normosecretors ($p<0.01$), but not in the other groups. The results show that when the vagus is stimulated, the response of the parietal cell mass in normosecretors is, to a greater extent, a reflection of the amount of gastrin released; among hypersecretors, it is predominantly the result of the large number of parietal cells being stimulated.

1341 A COMPARISON OF BASAL AND STIMULATED GASTRIC ACID AND DUODENAL BICARBONATE IN PATIENTS WITH AND WITHOUT DUODENAL ULCER DISEASE.

(Eng.) Gutierrez, L. V.; Baron, J. H. (Hammersmith Hosp., London W12 OHS, England). *Am. J. Gastroenterol.* 66(3):270-276; 1976.

Gastric (GA) and duodenal (DA) aspirates were analyzed in 20 control subjects and in 10 patients with duodenal ulcer, and the basal and maximum acid secretion (after pentagastrin stimulation) and the basal and near-maximum bicarbonate (BC) secretion (after secretin stimulation) were measured. In the basal secretion studies in controls, the volume of the DA was significantly greater than that of the GA, but there were no significant differences between the concentrations and outputs. In the patients, the volume of the DA was also significantly greater than that of the GA, but concentrations and outputs were significantly lower. There were no significant correlations between basal measurements of both aspirates in controls or patients. With respect to stimulated secretion, there were significant correlations between control gastric and duodenal volumes, but not between concentrations or outputs. The duodenal volumes and outputs were significantly higher than the gastric values. In the patients, there were significant correlations between gastric and duodenal volumes and outputs, but, again, not between concentrations. The outputs of gastric acid and duodenal BC in the patients were normal and almost identical (approximately 15-70 mEq/hr, mean 34.5). Under both basal and stimulated conditions, the patients secreted higher volumes of gastric juice, concentrations of acid, and acid outputs than controls. Although the volume of the basal DA was significantly higher in the patients, the BC concentration and output were only one-half that of the controls. This may be due to inadequate entry of BC into the duodenum, in spite of a normal BC secretory capacity.

1342 EXPERIENCE WITH SYNTHETIC SECRETIN IN THE TREATMENT OF DUODENAL ULCER.

(Eng.) Henn, R. M.; Selcon, S.; Sturdevant, R. A. L.; Isenberg, J. I.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *Am. J. Dig. Dis.* 21(11):921-925; 1976.

Thirteen hospitalized patients with endoscopically verified duodenal ulcer were studied to determine the effect of secretin on the clinical course of their disease. Seven patients received 333 μg of synthetic porcine secretin, s.c., every 4 hr for 10 days, and six patients received placebo injections on the same schedule. Repeat endoscopy was performed within 48 hr of completing the treatment period. The trial was discontinued because of transient, asymptomatic, hyperamylasemia in secretin-treated patients. Although significant gastric alkalinization could be reproducibly demonstrated in secretin-treated patients, secretin was not more effective than placebo in relieving pain or healing duodenal ulcer. Because the number of patients was small, however, definitive conclusions regarding efficacy of secretin in ulcer treatment could not be drawn.

1343 EFFECT OF PENTAGASTRIN ON TISSUE CULTURE OF GASTRIC AND DUODENAL MUCOSA ORIGINATING FROM PATIENTS WITH ULCER DISEASE.

(Pol.) Kleczkowska, A.; Kubien, E.; Wanicka, A.; Szafran, H.; Popiela, T. (Instytut Pediatrii AM, 30-663 Krakow, ul. Wielicka 265, Poland). *Pol. Tyg. Lek.* 30(50): 2081-2084; 1975.

The stimulating effect of pentagastrin (PG) on the culture of mucosal cells from the fundus and prepyloric region of the stomach and the duodenum, surgically removed from seven ulcer patients, is described. Cell cultures were grown routinely from the mucosa of all seven sections. Only the dishes whose bottoms were completely covered with multiplying cells were chosen for the study. They were divided into 2 groups, each containing 1 dish per patient. One group of culture cells received PG (0.5 μg/ml/day), the other group was given isotonic NaCl solution. The length of PG action on the cultures varied from 2 to 10 weeks, depending on the rate of complete coverage of the dish bottom. The fastest stimulation occurred in PG-treated cultures and controls from the duodenal mucosa; it was slower in the mucosa of the prepyloric area and slowest in treated and control cultures of the fundic region. The fact that PG-treated cell culture homogenates averaged 40% higher protein concentrations compared to controls was caused by a larger cellular mass. In one case, PG-treated fundic cells exhibited an epithelial composition of 56% versus 26.3% for NaCl solution and for fibroblasts, 33.7 versus 67.7%. Corresponding values for duodenal mucosa were 73.2 and 49.9%, resp., and for fibroblasts, 24.0 versus 47.2%. No clear-cut correlation between secretory capability of gastric mucosa and *in vitro* proliferation of fundic and prepyloric mucosa could be shown; it could, however, exist *in vivo*.

1344 LIPID ISLANDS IN THE GASTRIC MUCOSA AFTER RESECTION FOR BENIGN ULCER DISEASE.

(Eng.) Domellof, L.; Eriksson, S.; Helander, H. F.; Janunger, K. G. (Univ. Hosp., Univ. Umea, S-901 Umea, Sweden). *Gastroenterology* 72(1):14-18; 1977.

The prevalence of lipid islands after Billroth I and Billroth II resection was determined as a function of time in 316 patients, as well as in 286 as nonoperated controls. Gastroscopy and multiple biopsies were performed at selected intervals after surgery. The occurrence of single or multiple lipid islands increased with the postoperative time, independent of the original ulcer disease or the type of operation performed. In nonoperated patients, lipid islands were found in 6.3%, and approximately the same prevalence was found 1-3 yr after gastric surgery in Billroth II-operated patients. In both patient groups, a much higher prevalence was found 10-15 yr postoperatively, and 23 yr after Billroth II resection, 60% of the patients demonstrated lipid islands. At repeated gastroscopic examinations over a period of 1-2 yr, no certain changes in number, size, or distribution of the lipid islands were seen. The etiology of lipid islands is unknown, but intestinal-gastric reflux is the most plausible etiological factor.

1345 CARBENOXOLONE: A REVIEW OF ITS PHARMACOLOGICAL PROPERTIES AND THERAPEUTIC EFFICIACY IN PEPTIC ULCER DISEASE.

(Eng.) Pinder, R. M.; Brogden, R. N.; Sawyer, P. R.; Speight, T. M.; Spencer, R.; Avery G. S. (Australasian Drug Information Services, P.O. Box 34-030, Birkenhead, Auckland 10, New Zealand). *Drugs* 11(4):245-307; 1976.

1346 CARBENOXOLONE SODIUM: ITS ROLE IN ULCER HEALING.

(Eng.) Langman, M. J. S. (Univ. Nottingham, City Hosp., Nottingham, NG5 1PB, England). *Drugs* 11(4):241-244; 1976.

1347 NEW DRUG FOR ULCER THERAPY: PROGLUMIDE (FIRST RESULTS WITH ITS USE IN BLACK AFRICA).

(Fre.) Le Bras, M.; Bouchez, P.; Thomas, J. Y.; Ekra, A.; Bertrand, E. (No affiliation given). *Med. Afr. Noire* 22(6):473-475; 1975.

1348 EXISTENCE OF A SPECIFIC PANCREATIC FUNCTION IN PATIENTS WITH DUODENAL ULCER [Abstract].

(Eng.) Otte, M.; Thurmayr, R.; Thurmayr, G. R.; Forell, M. M. (II Medizinische Klinik der Universitat Munchen, Munich, W. Germany). *Biol. Gastroenterol. (Paris)* 9(1):84; 1976.

1349 GASTRIC ULCER: AN UNUSUAL PRESENTATION OF MALIGNANT MELANOMA.

(Eng.) Goldman, S. L.; Pollak, E. W.; Wolfman, E. F., Jr. (Dept. Surgery, Univ. California, Davis, CA 95616). *JAMA* 237(1):52; 1977.

STOMACH

1350 RELATION OF RECURRENCE OF GASTRIC ULCERS TO FUNDAL GASTRITIS AND EFFECT OF GEFARNATE IN PREVENTING RECURRENCE. (Eng.) Tatsuta, M.; Okuda, S. (Center Adult Diseases, 3-3 Nakamichi 1-chome, Higashinari-ku, Osaka 537, Japan). *Endoscopy* 8(3):137-141; 1976.

See also, 0957, 0973, 0979, 1145, 1153, 1177, 1233, 1236, 1241, 1319, 1332, 1648, 1705.

SMALL INTESTINE

1351 PRIMARY INTESTINAL LYMPHOMA OF "WESTERN" AND "MEDITERRANEAN" TYPE, ALPHA CHAIN DISEASE AND MASSIVE PLASMA CELL INFILTRATION: A COMPARATIVE STUDY OF 37 CASES. (Eng.) Lewin, K. J.; Kahn, L. B.; Novis, B. H. (Center Health Sciences, UCLA, Los Angeles, CA 90024). *Cancer* 38(6):2511-2528; 1976.

The clinical and pathological features of 17 "Western" type primary abdominal lymphomas (WTL) were compared with those of 14 "Mediterranean" type (MTL) lymphomas. The MTL's involved only young adult Mulatto and African patients in whom malabsorption and abdominal pain were the major clinical features. The WTL's also predominantly affected Mulatto patients, but four cases occurred in Caucasians, and the mean age at presentation was 20 yr later. An obstructive presentation was the most common; only one patient in this group had evidence of malabsorption. The WTL's were located mainly in the distal small bowel and were nearly all of the monomorphic lymphocytic or histiocytic type. The MTL's occurred mainly in the duodenum and jejunum. In the MTL's, a spectrum of cells, ranging from those resembling atypical lymphocytes to large histiocytic types, was seen, some of the latter resembling Reed-Sternberg cells. The pattern of mesenteric node infiltration in the MTL's was also unusual in that preservation of the medullary sinuses was a common finding. In the MTL's, a heavy infiltration of mature-looking plasma cells associated with a fairly severe villous atrophy in the lamina propria of the small bowel was present. In the WTL's, the adjacent small bowel did not show this feature. In addition to the above cases, three patients with a similar heavy plasma cell infiltrate and villous atrophy, but without evidence of a lymphoma, are described. These cases may represent examples of MTL in a premalignant phase. Also included in this study are three patients with alpha-chain disease (α-CD), all with a heavy plasma cell infiltration and villous atrophy of the lamina propria, a pleomorphic type lymphoma involving the mesenteric nodes in all, and the small bowel in two was seen. Both genetic and environmental factors may be operative in the MTL's including the cases of α-CD.

1352 DUODENAL CRYPTS. (Eng.) Wigh, R. E.; Cockerill, E. M. (Indiana Univ. Medical Center, 1100 W. Michigan St., Indianapolis, IN 46202). *South. Med. J.* 69(6):773-774; 1976.

1353 FERMENTATIVE DIARRHEA AND SMALL INTESTINAL BACTERIAL OVERGROWTH IN INFANCY. CORRELATION WITH NUTRITIONAL STATE. (Eng.) Neto, U. F.; Eiguer, T.; Toccalino, H.; Ogawa, K. (Dept. Pediatrics, Policlinico A. Posadas, R. Cons. Rodrigues Alves, 1229, 04014 Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(1):19-28; 1976.

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1358 EXPERIENCE WITH JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Benfield, J. R.; Greenway, F. L.; Bray, G. A.; Barry, R. E.; Lechago, J.; Mena, I.; Schedewie, H. (UCLA Sch. Medicine, Harbor General Hosp., Campus, Torrance, CA). *Surg. Gynecol. Obstet.* 143(3):401-410; 1976.

1359 RADIOLOGICAL FINDINGS AFTER JEJUNOILEAL SHUNT PERFORMED FOR EXTREME OBESITY. (Ger.) Husemann, B.; Holik, B.; Banz, H.; Mrozek, B. (Chirurgische Klinik und Poliklinik, Krankenhausstr. 13, D-8520 Erlangen, W. Germany). *Munch. Med. Wochenschr.* 118(29/30):937-940; 1976.

1360 INTESTINAL ENZYMES FOLLOWING JEJUNOILEAL BYPASS. (Eng.) Stein, T.; Wise, L. (Long-Island Jewish-Hillside Medical Center, New Hyde Park, NY). *Clin. Res.* 24(5):629A; 1976.

1361 INTESTINAL ABSORPTION AFTER JEJUNOILEAL BYPASS. (Eng.) Stein, T.; Wise, L. (Long-Island Jewish-Hillside Medical Center, New Hyde Park, NY). *Clin. Res.* 24(5):629A; 1976.

1362 INTESTINAL ABSORPTION OF CALCIUM AND PHOSPHORUS: EXPERIMENTS ON INTERACTION BETWEEN VITAMIN D AND ADRENOCORTICAL HORMONE. (Eng.) Teotia, M.; Teotia, S. P. S.; Raman, T.; Sharma, N. L.; Singh, R. K. (L.L.R.M. Medical Coll., Meerut, India). *Indian J. Pediatr.* 42(324):1-9; 1975.

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1364 EFFECT OF NEUROLEPTIC DRUGS ON BLOOD POTASSIUM AND SODIUM LEVELS IN CHILDREN WITH SERIOUS ACUTE INTESTINAL INFECTIONS. (Rus.) Krasovitskiy, Z. I. (Sumsk Municipal Hosp. No. 4, Sumsk, USSR). *Pediatriia* (6):53-54; 1975.

1365 COMPLICATIONS OF MECKEL'S DIVERTICULUM. (Hun.) Fedor, E.; Bodrogi, T. (Debreceni Orvostudomanyi Egyetem, I. Sebeszeti Klinika, Debrecen, Hungary). *Orv. Hetil.* 116(45):2653-2656; 1975.

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1367 INTRALUMINAL DIVERTICULUM OF DUODENUM WITH ASSOCIATED DIVERTICULITIS AND GASTROINTESTINAL BLEEDING. (Eng.) Feiss, J. S.; Plevy, D. J.; Dickey, J. W. (Broward General Medical Center, Ft. Lauderdale, FL). *South. Med. J.* 69(2):246-247; 1976.

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1369 INTESTINAL ENTEROKINASE DEFICIENCY. (Eng.) Follett, G. F.; MacDonald, T. H. (Royal Hosp. Sick Children, Yorkhill, Glasgow, Scotland). *Acta Pediatr. Scand.* 65(5):653-655; 1976.

1370 STRANGULATION OF SMALL INTESTINE IN AN OPENING OF THE BROAD LIGAMENT. (Eng.) Karaharju, E.; Hakkiluoto, A. (Univ. Central Hosp., Haartmeninkatu 4, 00290, Helsinki 29, Finland). *Int. Surg.* 60(8):430; 1975.

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1372 MORTALITY IN NEONATAL DUODENAL OBSTRUCTION. A REVIEW OF 76 CASES COMPARED WITH A PREVIOUS REVIEW OF 142 CASES. (Eng.) Perrelli, L.; Wilkinson, A. W. (Instituto di Patologia Chirurgica, Cattolica Del Sacro Cuore, Rome, Italy). *J. R. Coll. Surg. Edinb.* 20(6):365-373; 1975.

1373 PNEUMATIC ILEAL PERFORATION: AN UNUSUAL COMPLICATION OF COLONOSCOPY. (Eng.) Razzak, I. A.; Millan, J.; Schuster, M. M. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Gastroenterology* 70(2):268-271; 1976.

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1375 ECTOPIC GASTRIC MUCOSA IN THE ILEUM: A CAUSE OF INTUSSUSCEPTION. (Eng.) Doberneck, R. C.; Deane, W. M.; Antoine, J. E. (No affiliation given). *J. Pediatr. Surg.* 11(1):99-100; 1976.

1376 INTUSSUSCEPTION IN CHRONIC RENAL FAILURE [Abstract]. (Eng.) Carr, J. B.; Luft, F. C.; Hamburger, R. J.; Kleit, S. A. (107 Fesler Hall, Indiana Univ. Medical Center, 1100 W. Michigan St., Indianapolis, IN 46202). *Arch. Surg.* 111(8):866; 1976.

1377 NEW DATA ON THE PATHOGENESIS OF PERNICIOUS ANEMIA IN CONNECTION WITH SUCCESSFUL TREATMENT OF DUODENAL INTRINSIC FACTOR. (Hun.) Horanyi, M.; Sarfy, E. (XIX. ker. Szakorvosi Rendelointezet korhazi belgyogyaszati osztalya, Budapest, Hungary). *Orv. Hetil.* 116(43):2538-2542; 1975.

See also, 0962, 1094, 1101, 1118, 1128, 1130, 1131, 1132, 1133, 1144, 1177, 1184, 1189, 1191, 1193, 1195, 1198, 1200, 1202, 1222, 1238, 1242, 1252, 1278, 1286, 1294, 1307, 1323, 1328, 1329, 1379, 1399, 1487, 1556, 1565, 1627, 1635, 1651, 1652, 1658, 1665, 1666, 1669, 1670, 1676, 1695, 1702, 1730, 1738.

SMALL INTESTINE

Malabsorption

1378 COELIAC DISEASE AND DERMATITIS HERPETIFORMIS: FURTHER STUDIES OF THEIR RELATIONSHIP. (Eng.) Scott, B. B.; Young, S.; Rajah, S. M.; Marks, J.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 17(10):759-762; 1976.

The incidences of celiac disease and of histocompatibility antigen HL-A8 were determined in 48 patients with dermatitis herpetiformis (DH), and the separate incidences of HL-A8 in DH patients with and without evidence of celiac disease were investigated. The diagnosis of DH was established by both the presence of a typical rash and of papillary IgA in clinically uninvolved skin by direct immunofluorescence. Nineteen percent of the DH patients had no evidence of celiac disease. The incidence of HL-A8 in the DH patients was 78%, which is considerably greater than that in healthy controls and no different from that reported in celiac disease. Furthermore, the incidence of HL-A8 was equally increased in those DH patients without evidence of celiac disease, suggesting that HL-A8 is associated with DH, regardless of its association with celiac disease.

1379 COMMON PROBLEMS OF MALABSORPTION. (Eng.) Cooke, W. T. (General Hosp., Birmingham, England). *Practitioner* 216(1296): 637-641; 1976.

1380 ULTRASTRUCTURE OF SMALL INTESTINE MUCOSA IN CHILDREN WITH CELIAC DISEASE. (Spa.) Valenti, J.; Molina, J. R.; Kouri, J.; Sosa, E. Z. (Facultad de Ciencias Medicas, Universidad de La Habana, Apartado 491 Habana 15, Cuba). *Rev. Cubana Pediatr.* 47(2):181-208; 1975.

1381 CELIAC DISEASE. A STUDY ON 36 CHILDREN. (Spa.) Blanco Rabassa, E.; Sagaro Gonzalez, E.; Fragoso Arbelo, T.; Castaneda Guillot, C.; Valenti, J. (Universidad de La Habana, Apartado 491, La Habana 15, Cuba). *Rev. Cubana Pediatr.* 47(2):209-229; 1975.

1382 OATS AND BARLEY TOXICITY IN COELIAC PATIENTS. (Eng.) Baker, P. G.; Read, A. E. (Franchay Hosp., Dept. Medicine, Univ. Bristol, Bristol BS16 1LE, England). *Postgrad. Med. J.* 52(607):264-268; 1976.

1383 EFFECT OF CELIAC SPRUE ON FOLATE DIGESTION AND ABSORPTION [Abstract]. (Eng.) Halsted, C. H.; Cantor, D.; Reisenauer, A.; Romero, J. (Dept. Internal Medicine, Univ. California, Davis, CA). *Clin. Res.* 24(3):285A; 1976.

1384 CARBOHYDRATE MALABSORPTION IN NECROTIZING ENTEROCOLITIS. (Eng.) Book, L. S.; Herbst, J. J.; Jung, A. L. (Dept. Pediatrics, Univ. Utah, Salt Lake City, UT 84123). *Pediatrics* 57(2):201-204; 1976.

1385 MILK INTOLERANCE IN ALCOHOLICS [Abstract]. (Eng.) Perlow, W.; Baraona, E.; Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY). *Clin. Res.* 24(3):503A; 1976.

1386 PRURIGO NODULARIS AND GLUTEN ENTEROPATHY. (Eng.) McKenzie, A. W.; Stubbing, D. G.; Elvy, B. L. (Norfolk and Norwich Hosp., Norwich, England). *Br. J. Dermatol.* 95(1):89-92; 1976.

1387 THE NOONAN SYNDROME WITH INTESTINAL LYMPHANGIECTASIA. (Eng.) Herzog, D. B.; Logan, R.; Kooistra, J. B. (Univ. Wisconsin Medical Sch., 1300 University Ave., Madison, WI 53706). *J. Pediatr.* 88(2):270-272; 1976.

1388 LACTOSE MALABSORPTION AMONG U.S. ETHNIC GROUPS: STUDIES IN AMERICANS OF MEXICAN DESCENT [Abstract]. (Eng.) Woteki, C. E.; Weser, E.; Young, E. A. (Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 24(3):505A; 1976.

See also, 0871, 1089, 1134, 1351, 1355, 1430, 1441,
1645, 1651, 1658, 1718.

LARGE INTESTINE

1389 CHANGES IN FECAL COMPOSITION AND COLONIC FUNCTION DUE TO CEREAL FIBER. (Eng.) Cummings, J. H.; Hill, M. J.; Jenkins, D. J. A.; Pearson, J. R.; Wiggins, H. S. (Dunn Nutrition Unit, Milton Rd., Cambridge, England). *Am. J. Clin. Nutr.* 29(12):1468-1473; 1976.

The effect on colonic function of adding wheat fiber to the metabolically-controled diets of six healthy volunteers for 3 weeks was studied. Increasing dietary fiber intake from 17 to 45 g/day increased fecal weight from 79 ± 6.6 g/day to 228 ± 29.9 g/day and shortened mean transit time, measured by a continuous marker method, from 57.8 ± 8.3 hr to 40.3 ± 8.9 hr. The increase in fecal weight was largely due to water. Fiber caused a dilution of fecal marker and an increase in fecal fat, nitrogen, and calcium output. Fecal sodium, potassium, and chloride showed only small changes, but volatile fatty acid output increased significantly without concentrations changing. Fecal bile acid output increased from 199 ± 46 mg/day to 279 ± 46 mg/day. This study shows that dietary wheat fiber affects colonic function in ways that might be important in protecting individuals against colonic cancer.

1390 ARTERIOVENOUS MALFORMATION IN CHRONIC GASTROINTESTINAL BLEEDING.

(Eng.) Cavett, C. M.; Selby, J. H., Jr.; Hamilton, J. L.; Williamson, J. W. (Univ. Mississippi Medical Center, 2500 N. State St., Jackson, MS 39216). *Ann. Surg.* 185(1):116-121; 1977.

Two cases of arteriovenous malformation (an 18-yr-old woman and a 61-yr-old man) are presented, and 47 other reported cases are reviewed. In both cases, barium contrast studies and endoscopy failed to demonstrate the lesion; this is also true in all previous cases. The diagnosis was made in both patients by selective mesenteric arteriography, which demonstrated a characteristic vascular tuft and very early venous phase. Forty-five percent of the previously reported cases were found in the cecum; 37 (80%) involved the distal ileum, cecum, ascending colon, or hepatic flexure. Seventy-five percent of all patients fall into the 50- to 80-yr age range. The literature reveals a recurring pattern of chronic gastrointestinal blood loss, anemia, and delay (even negative abdominal explorations) before the diagnosis is finally made. A more aggressive approach to chronic gastrointestinal bleeding through the use of selective mesenteric arteriography is suggested.

1391 PATHOGENESIS OF MASSIVELY BLEEDING COLONIC DIVERTICULOSIS: NEW OBSERVATIONS.

(Eng.) Meyers, M. A.; Alonso, D. R.; Baer, J. W. (New York Hosp.-Cornell Medical Center, New York, NY 10021). *Am. J. Roentgenol.* 127(6):901-908; 1976.

The site of bleeding, etiology, and pathogenesis in 10 cases of massively bleeding colonic diverticulosis were studied. Arteriographic, microangiographic, and detailed histologic observations demonstrated strikingly consistent changes related to the characteristic angioarchitecture of colonic diverticula. These changes included: asymmetric rupture of the vas rectum toward the lumen of the diverticulum precisely at its dome or its antimesenteric margin; conspicuous eccentric intimal thickening of the vas rectum, often with thinning of the media and duplication of the internal elastic lamina at and near the bleeding point; and general absence of diverticulitis. Comparison with control colonic diverticula suggested that traumatic factors arising within the diverticular or colonic lumen induce asymmetric intimal proliferation and segmental weakening of the associated vas rectum, predisposing to rupture and massive bleeding.

1392 FECAL CHARACTERISTICS CONTRASTED IN THE IRRITABLE BOWEL SYNDROME AND DIVERTICULAR DISEASE.

(Eng.) Goy, J. A. E.; Eastwood, M. A.; Mitchell, W. D.; Pritchard, J. L.; Smith, A. N. (Western General Hosp., Edinburgh, Scotland). *Am. J. Clin. Nutr.* 29(12):1480-1484; 1976.

The fecal characteristics of 11 healthy men, 14 patients with uncomplicated diverticular disease, 7 patients with spastic colon, and 17 patients with idiopathic diarrhea were compared. During a 3- to 5-day stool collection, no significant differences in fecal wet weight, dry weight, or total bile acid excretion were detected in the four groups. The water content of the stools of patients with idiopathic diarrhea was significantly greater than that of the stools of controls (79.8% versus 73.6%, $p<0.05$). Significantly less magnesium, potassium, and calcium was found in the stools of patients with diverticular disease than in those of controls ($p<0.0025$, $p<0.01$, and $p<0.05$, resp.), and a similar trend was noted in patients with spastic colon. These changes did not relate to the age of the patients, suggesting a common etiology for these disorders. The presence of increased water and primary bile acids in the feces of patients with idiopathic diarrhea suggests that this is a separate entity.

1393 PHASE III COMPARISON OF THE TREATMENT OF ADVANCED GASTROINTESTINAL CANCER WITH BOLUS WEEKLY 5-FU VS. METHYL-CCNU PLUS BOLUS WEEKLY 5-FU: A SOUTHWEST ONCOLOGY GROUP STUDY.

(Eng.) Baker, L. H.; Talley, R. W.; Matter, R.; Lehane, D. E.; Ruffner, B. W.; Jones, S. E.; Morrison, F. S.; *et al.* (Grace Hosp., 4160 John R. St., Detroit, MI 48201). *Cancer* 39(1):1-7; 1976.

The efficacy of a weekly bolus injection of 5-fluorouracil (5-FU; 400 mg/m^2, i.v.) or 5-FU (400 mg/m^2, i.v.) plus 1-2-chloroethyl-3-4-methyl 4-cyclohexyl 1-nitrosourea (methyl-CCNU; 175 mg/m^2, p.o., every 6 weeks) in the treatment of advanced gastrointestinal cancer was investigated in a randomized and stratified study of 294 patients. There was a highly significant partial remission rate for patients receiving the combination treatment ($p<0.01$). Nearly all patients receiving methyl-CCNU experienced nausea and vomiting; in the group receiving 5-FU alone, only 32% of the patients had gastrointestinal (GI) toxicity. A total of nine patient characteristics were examined for their relation to response and survival. The most important were (in order): sex, time from initial diagnosis to treatment, and performance status. These results confirm those of a previously published study. In the treatment of gastrointestinal cancer, a superior response rate may be attained with the combination of 5-FU and methyl-CCNU, in comparison with that attained with 5-FU alone. In colorectal cancer, the response rate with 5-FU was 9.5%, while the two drug treatment produced a response of 31.8% ($p=0.009$). The response in all gastrointestinal cancers to 5-FU was 10.6%, compared with 29.3% for the combination ($p=0.012$).

1394 SIMULTANEOUS TRANSITION OF MULTIPLE POLYPS INTO CARCINOMA IN THE LARGE INTESTINE. (Eng.) Kozuka, S.; Taki, T.; Kubota, K.; Yokoyama, Y. (Nagoya Univ. Sch. Medicine, 65 Tsurumacho, Showaku, Nagoya, 466, Japan). *Dis. Colon Rectum* 19(8):655-659; 1976.

Reports of surgical biopsy specimens from 41 patients with multiple epithelial neoplasms of the large intestine were evaluated. Sixteen patients had multiple polyps; 12 had a carcinoma, as well as one or more polyps; and 13 had two or more carcinomas. The number of polyps and carcinomas in each patient ranged from two to six. Distances between the neoplasms varied, but multiple polyps were usually found in groups within a single segment of the large intestine. Histologic specimens of the polyps were assigned to five grades according to the extent of epithelial pseudostratification in the glands. In every patient, the grades of histologic atypia among the multiple neoplasms were the same or only minimally different. Therefore, these lesions were considered to have arisen simultaneously or successively within a relatively short period. Of the 25 patients who had carcinoma *in situ* or infiltrating carcinoma, 17 had accompanying precancerous lesions or carcinoma elsewhere in the large intestine, and 8 had accompanying nonmalignant polyps. Areas of frankly infiltrating carcinoma frequently contained residues of adenomatous lesions, which suggested that the carcinomas had arisen from adenomatous polyps.

1395 FECAL STEROIDS IN POLYPOSIS COLI AND ILEORECTOSTOMY PATIENTS. (Eng.) Watne, A. L.; Core, S. K. (Charleston Foundation, West Virginia Univ., Morgantown, WV 26506). *J. Surg. Res.* 19(3):157-161; 1975.

Fecal bile acids and neutral steroids were examined in familial polyposis patients before and after surgery to determine whether abnormal fecal steroid levels act as carcinogens or as stimulants in the etiology of colon polyps. Fecal samples were collected from seven controls, seven patients with untreated Gardner's syndrome and/or familial polyposis, and five patients surgically treated for Gardner's syndrome by a subtotal colectomy with ileorectostomy. The cholic, chenodeoxycholic, lithocholic, deoxycholic, and hyodeoxycholic acid levels were determined in fecal samples. There was no significant difference in the total bile acids excreted between the three patient groups. The mean fecal excretions of cholic acid and chenodeoxycholic acid were 1.8 ± 1.7 and 1.6 ± 1.1 mg/g in the ileorectostomy group. The excretion of cholic acid at 0.6 ± 0.8 mg/g and chenodeoxycholic acid at 1.0 ± 0.8 mg/g in the polyposis group was significantly higher than in controls, who gave values of 0.06 ± 0.15 and 0.1 ± 0.3 mg/g, resp. There was no coprostanol in the fecal samples of the ileorectostomy group; means of 9.0 ± 8.0 mg/g and 18.0 ± 10.0 mg/g were found in the polyposis and control groups, resp. The cholesterol level for the ileorectostomy group was 17 ± 5 mg/g, compared with values of 12.0 ± 7.0 and 5.0 ± 4.0 mg/g for the polyposis and control groups, resp., indicating a lack of microbial action on cholesterol in the treated patients. Lithocholic and deoxycholic acid levels dropped from 3.6 ± 1.7 and 3.5 ± 1.6 mg/g, resp., in controls to 1.1 ± 0.8 and 1.0 ± 0.9 mg/g in the ileorectostomy group, with the polyposis group giving intermediate values of 2.4 ± 0.9 and 2.4 ± 0.7 mg/g, resp. The cholesterol level may influence cell permeability within the colon, thus increasing the susceptibility to carcinogenic agents. The change in fecal steroid pattern in patients with Gardner's syndrome indicates a higher risk to colon-related carcinogenesis.

1396 THE EPIDEMIOLOGIC STUDY OF SUBSITE LARGE BOWEL CANCER. (Eng.) Lohsoonthorn, P. (Univ. Pittsburgh, Pittsburgh, PA). *Diss. Abstr. Int.* [*B*] 36(9):4399-B; 1976.

1397 USE OF ADRENERGIC SUBSTANCES IN MOTOR DISORDERS OF THE LARGE INTESTINE. (Rus.) Rozenbaum, I. M. (Propedeutic Dept. Internal Diseases, O. V. Kuusinev Petrozavodsk Univ., Petrozavodsk, USSR). *Klin. Med. (Mosk.)* 54(1):56-60; 1976.

1398 THE EFFECT OF METHIONINE ON COLONIC WOUND HEALING IN MALNOURISHED RATS. (Eng.) Irvin, T. T. (Royal Infirmary, Sheffield, England). *Br. J. Surg.* 63(3):237-240; 1976.

1399 INGESTED FOREIGN BODIES OF THE GASTROINTESTINAL TRACT. (Eng.) Schwartz, G. F.; Polsky, H. S. (Jefferson Medical Coll., Philadelphia, PA 19107). *Am. Surg.* 42(4):236-238; 1976.

1400 CONTINUOUS ELECTROCARDIOGRAPHIC MONITORING DURING COLONOSCOPY. (Eng.) Alam, M.; Schuman, B. M.; Duvernoy, W. F. C.; Madrazo, A. C. (Henry Ford Hosp., 2799 W. Grand Blvd., Detroit, MI 48202). *Gastrointest. Endosc.* 22(4):203-205; 1976.

1401 PRIMARY APPENDECTOMY. (Eng.) Mason, L. B.; Deyden, W. E. (New Hanover Memorial Hosp., 2131 S. 17th St., Wilmington, NC 28401). *Am. Surg.* 42(4):239-243; 1976.

1402 ENDOSCOPIC APPENDECTOMY. (Eng.) Wirtschafter, S. K.; Kaufman, H. (1360 West Sixth St., Suite 120, San Pedro, CA 90732). *Gastrointest. Endosc.* 22(3):173-174; 1976.

1403 DIAGNOSTIC PUNCTURE OF THE ABDOMEN IN ACUTE APPENDICITIS. (Rus.) Kazmagambetov, Zh. K. (Alma-Ata Medical Inst., Alma-Ata, USSR). *Vestn. Khir.* 115(9):39-41; 1975.

1404 THE TREATMENT OF PATIENTS WITH APPENDICULAR INFILTRATION. (Rus.) Gramenitskaia, M. S.; Agzamov, M. A. (2nd Clinic Surgery for Postgraduate Medical Studies, M. S. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 116(1):55-58; 1976.

1405 CLINICAL AND MORPHOLOGICAL ASPECTS OF ACUTE CATARRHAL APPENDICITIS IN CHILDREN. (Rus.) Tagirov, K. Kh.; Alimov, V. A.; Khegai, E. N. (Dept. Pediatric Surgery, Central Asian Medical Inst. Pediatrics, USSR). *Vestn. Khir.* 116(1): 82-84; 1976.

1406 PERFORATED APPENDIX AND ANAEROBIC BACTERIA. (Fin.) Kekomaki, M.; Seppala, I. J.; Louhimo, I. (HYKS:n lastentautien klinikka, 00290 Helsinki 29, Finland). *Duodecim* 92(1): 13-19; 1976.

1407 PERFORATED APPENDIX IN SITUS INVERSUS VISCERUM: A CASE REPORT. (Eng.) Pillay, S. P. (Dept. Surgery, Univ. Natal, Durban, Republic South Africa). *S. Afr. Med. J.* 50(5):141-143; 1976.

1408 EPITHELIAL NEOPLASMS OF THE VERMIFORM APPENDIX (EXCLUSIVE OF CARCINOID): I. ADENOCARCINOMA OF THE APPENDIX. (Eng.) Wolff, M.; Ahmed, N. (Coll. Physicians and Surgeons, 630 W. 168 St., New York, NY 10032). *Cancer* 37(5):2493-2510; 1976.

1409 EPITHELIAL NEOPLASMS OF THE VERMIFORM APPENDIX (EXCLUSIVE OF CARCINOID): II. CYSTADENOMAS, PAPILLARY ADENOMAS, AND ADENOMATOUS POLYPS OF THE APPENDIX. (Eng.) Wolff, M.; Ahmed, N. (Coll. Physicians and Surgeons, 630 W. 168 St., New York, NY 10032). *Cancer* 37(5): 2511-2522; 1976.

1410 MELANOSIS COLI. (Ger.) Franken, F. H.; Wiechers, B. (Innere Abteilung des Krankenhauses St. Josef, D-5600 Wuppertal-Elberfeld, Bergstrasse 6-12, W. Germany). *Leber Magen Darm* 5(6):269-271; 1975.

1411 PSEUDOMEMBRANEOUS COLITIS ASSOCIATED WITH ANTIBIOTICS. (Eng.) Hakkal, H. G. (Georgetown Univ. Hosp., 3800 Reservoir Rd., N.W., Washington, DC 20007). *Am. J. Gastroenterol.* 65(1):78-82; 1976.

1412 NECROTIC COLITIS IN THE PRESENCE OF NORMAL VASCULARIZATION OF THE COLON. (Eng.) Deleu, H. W. O. (St. Canisius Ziekenhuis, Nijmegen, Netherlands). *Arch. Chir. Neerl.* 28(1):55-62; 1976.

1413 ISCHEMIC AND NECROTIZING COLITIS. (Eng.) Larmi, T. K. I.; Heikkinen, E.; Huttunen, R. (Oulu Univ. Central Hosp., 90220 Oulu 22, Finland). *Ann Chir. Gynaecol. Fenn.* 64(1):1-4; 1975.

1414 POLYPS AND DIVERTICULOSIS OF LARGE BOWEL IN AUTOPSY POPULATION OF AKITA PREFECTURE, COMPARED WITH MIYAGI. HIGH RISK FOR COLORECTAL CANCER IN JAPAN. (Eng.) Sato, E.; Ouchi, A.; Sasano, N.; Ishidate, T. (Tohoku Univ. Sch. Medicine, 2-1 Seiryomachi, Sendai, Japan). *Cancer* 37(3): 1316-1321; 1976.

1415 DIETARY FIBER AND DIVERTICULAR DISEASE. (Eng.) Connell, A. M. (Univ. Cincinnati Medical Center, Cincinnati, OH). *Hosp. Prac.* 11(3):119-124; 1976.

1416 COLOSCOPIC CHARACTERIZATION OF POLYPOSIS OF THE LARGE INTESTINE: MACROSCOPIC ASPECTS AND HISTOLOGICAL CORRELATIONS. (Ita.) Rossini, F. P.; Ferrari, A.; Droetto, G. (Ospedale Maggiore di S. Giovanni Battista e della Citta, Turin, Italy). *Minerva Med.* 67(8):502-505; 1976.

1417 UNUSUAL BENIGN LESIONS OF THE COLON. (Eng.) Cromer, J. K. (George Washington Univ. Medical Sch., Washington, DC). *J. Abdom. Surg.* 17(9):206-213; 1975.

1418 INTUSSUSCEPTION IN THE OLDER CHILD. (Eng.) Fallis, J. C. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *Can. Med. Assoc. J.* 114(1): 38-39, 42; 1976.

1419 SPONTANEOUS PERFORATION OF THE PROXIMAL COLON FOLLOWING LUNG SURGERY. (Eng.) Koikkalainen, K.; Jarvinen, A. (Univ. Central Hosp., Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Ann. Chir. Gynaecol. Fenn.* 64(1):18-21; 1975.

1420 ACUTE PERFORATION OF THE COLON. (Eng.) Lozon, A. A.; Duff, J. H. (Victoria Hosp., London, Ontario, Canada). *Can. J. Surg.* 19(1): 48-51; 1976.

1421 TREATMENT OF VOLVULUS OF THE COLON BY COLONOSCOPY. (Eng.) Ghazi, A.; Shinya, H.; Wolff, W. I. (Beth Israel Medical Center, New York, NY 10003). *Ann. Surg.* 183(3):263-265; 1976.

1422 ABDOMINAL DESMOID MASSES IN GARDNER'S SYNDROME. (Eng.) Menuck, L. S. (Radiology Service [114], Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Gastrointest. Radiol.* 1(1):81-84; 1976.

1423 FOETAL THYMIDINE KINASE IN TUMOURS AND COLONIC FLAT MUCOSA OF MAN. (Eng.)

Salser, J. S.; Balis, M. E. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Nature* 260(5548):261-263; 1976.

1424 AGE DISTRIBUTION OF PATIENTS WITH CARCINOMA OF THE COLON IN A GENERAL HOSPITAL IN IRAN. (Eng.) Vakili, C.; Fatourechi, V. (Pars Hosp., 147, Elizabeth II Blvd., Tehran, Iran). *Surgery* 79(1):118-119; 1976.

1425 CANCER OF THE COLON AND RECTUM: A REVIEW OF THE NEWER TECHNICS IN DIAGNOSIS AND TREATMENT. (Eng.) Beahrs, O. H.; Wilson, S. M. (Dept. Surgery, Mayo Clinic, Rochester, MN). *Adv. Surg.* 9:235-246; 1975.

1426 PORTAL PYAEMIA SECONDARY TO CARCINOMA OF THE RECTUM. (Eng.) Ritchie, J. D. (Royal North Shore Hosp., Sydney, Australia). *Aust. N.Z. J. Surg.* 45(3):284-285; 1975.

1427 RECTAL SUCTION BIOPSY IN THE DIAGNOSIS OF HIRSCHSPRUNG DISEASE IN INFANTS. (Eng.) Yunis, E. J.; Dibbins, A. W.; Sherman, F. E. (Children's Hosp. Pittsburgh, 125 DeSoto St., Pittsburgh, PA 15213). *Arch. Pathol. Lab. Med.* 100(6):329-333; 1976.

1428 HIRSCHSPRUNG'S DISEASE. (Eng.) Schnaufer, L. (Children's Hosp., 34th St. and Civic Center Blvd., Philadelphia, PA 19104). *Surg. Clin. North Am.* 56(2):349-359; 1976.

1429 ABNORMALITIES OF FUNCTION AND FAECAL WATER FOLLOWING THE MODIFIED SOAVE OPERATION FOR HIRSCHSPRUNG'S DISEASE. (Eng.) Postuma, R.; Corkery, J. J. (Inst. Child Health, Univ. Birmingham, Francis Rd., Birmingham, B16 8ET, England). *Prog. Pediatr. Surg.* 9:141-154; 1976.

1430 MANOMETRIC STUDIES OF ANORECTAL DISORDERS IN INFANCY AND CHILDHOOD: AN INVESTIGATION OF THE PHYSIOPATHOLOGY OF CONTINENCE AND DEFAECATION. (Eng.) Meunier, P.; Mollard, P.; Jaubert, M.; Jaubert de Beaujeu, M. (Hopital Debrousse, 69005 Lyon, France). *Br. J. Surg.* 63(5):402-407; 1976.

1431 IMPERFORATE ANUS. (Eng.) Adkins, J. C.; Kiesewetter, W. B. (Sch. Medicine, Univ. Pittsburgh, Pittsburgh, PA 15261). *Surg. Clin. North Am.* 56(2):379-394; 1976.

1432 THE MORPHOLOGICAL PRINCIPLES OF ANORECTAL CONTINENCE. (Eng.) Stelzner, F. (Dept. Surgery, Johann-Wolfgang-Goethe-Univ., Theodor-Stern-Kai 7, 6 Frankfurt a.M., W. Germany). *Prog. Pediatr. Surg.* 9:1-6; 1976.

1433 THE PROBLEM OF ANORECTAL CONTINENCE. (Eng.) Holschneider, A. M. (Kinderchirurgische Klinik der Univ.-Kinderklinik Munchen, Lindwurmstrasse 4, 8 Munchen 2, W. Germany). *Prog. Pediatr. Surg.* 9:85-97; 1976.

1434 PRIMARY RECTAL ECTASIA. A QUANTITATIVE STUDY OF SMOOTH MUSCLE CELLS IN NORMAL AND HYPERTROPHIED HUMAN BOWEL. (Eng.) Brent, L.; Stephens, F. D. (Royal Children's Hospital Res. Foundation, Melbourne, Victoria, Australia). *Prog. Pediatr. Surg.* 9:41-62; 1976.

1435 HEMORRHOIDS: TOTAL LIGATION IN ONE SESSION. (Eng.) Katchian, A. (Harrisville Clinic, Adena, OH). *Am. J. Proctol.* 27(2):65-67; 1976.

See also, 0937, 1132, 1135, 1136, 1178, 1179, 1182, 1192, 1193, 1196, 1199, 1223, 1238, 1240, 1253, 1254, 1255, 1278, 1323, 1328, 1363, 1364, 1373, 1374, 1376, 1556, 1565, 1644, 1651, 1665, 1666, 1669, 1672, 1676, 1682, 1722, 1727, 1728, 1738, 1742.

LARGE INTESTINE

Ulcerative Colitis

1436 ANTIMICROBIAL PROBES IN EXPERIMENTAL ULCERATIVE COLITIS: PROTECTION WITH METRONIDAZOLE [Abstract]. (Eng.) Onderdonk, A. B.; Hermos, J. A.; Dzink, J. L.; Bartlett, J. G. (Tufts-New England Medical Center, Boston, MA). *Clin. Res.* 25(3):316A; 1977.

1437 PANTOTHENIC ACID, COENZYME A, AND HUMAN CHRONIC ULCERATIVE AND GRANULOMATOUS COLITIS. (Eng.) Ellestad-Sayed, J. J.; Nelson, R. A.; Adson, M. A.; Palmer, W. M.; Soule, E. H. (Dept. Pediatrics, Univ. Manitoba, Winnipeg, Canada). *Am. J. Clin. Nutr.* 29(12):1333-1338; 1976.

1438 SIGNIFICANCE OF ANERGY TO DINITROCHLOROBENZENE (DNCB) IN INFLAMMATORY BOWEL DISEASE: FAMILY AND POST-OPERATIVE STUDIES [Abstract]. (Eng.) Meyers, S.; Sachar, D. B.; Taub, R. N.; Janowitz, H. D. (Mount Sinai Sch. Medicine, New York, NY). *Clin. Res.* 24(5):628A; 1976.

See also, 1104, 1201, 1714, 1732, 1735, 1739, 1744, 1745.

PANCREAS

1439 ENDOSCOPIC PANCREATOGRAPHY IN EVALUATING RESULTS OF PANCREATICO-JEJUNOSTOMY. (Eng.) Kugelberg, C.; Wehlin, L.; Arnesjo, B.; Tylen, U. (Lasarettet, Fach, S-261 20 Landskrona, Sweden). *Gut* 17(4):267-272; 1976.

Postoperative results of two different types of pancreaticojejunostomy in 13 patients were evaluated with endoscopic retrograde cholangiopancreatography (ERCP). In four patients with longitudinal split of the pancreatic duct, two cases exhibited progress of the ductal inflammatory changes (further dilatation, irregularity, and formation of intraluminal concretions). Shunt patency was evident in all four cases on postoperative ductography. Among nine patients in whom caudal pancreaticojejunostomy was performed, definite signs of progress of inflammatory ductal changes were noted in six cases. Shunt patency, as evidenced by the passage of contrast medium, was obvious in one case and uncertain in one. All patients reported clinical improvement after surgery. It is concluded that pancreaticojejunostomy for chronic or acute relapsing pancreatitis is not a curative measure, but it may be regarded as palliative surgical intervention.

1440 CARCINOEMBRYONIC ANTIGEN (CEA) ACTIVITY IN PANCREATIC JUICE OF PATIENTS WITH PANCREATIC CARCINOMA AND PANCREATITIS. (Eng.) Sharma, M. P.; Gregg, J. A.; Loewenstein, M. S.; McCabe, R. P.; Zamcheck, N. (Deaconess Hosp., Boston, MA). *Cancer* 38(6):2457-2461; 1976.

The levels of carcinoembryonic antigen (CEA) activity in plasma and in pure pancreatic juice from 8 patients with carcinoma of the pancreas and 28 patients with pancreatitis were compared with those from 13 controls with no demonstrable pancreatic disease. Juice specimens were obtained via direct transduodenal cannulation of the pancreatic duct. The mean pancreatic juice CEA activities in controls, pancreatitis, and pancreatic carcinoma patients were 8.1 ng/ml, 18.6 ng/ml, and 309 ng/ml, resp. Pancreatic juice CEA activity in patients with cancer of the pancreas was significantly higher than in those with pancreatitis or in controls. None of the 32 patients with both pancreatic juice CEA activity less than 30 ng/ml and plasma CEA less than 2.5 ng/ml had pancreatic cancer; 3 of the 4 patients with CEA elevations in both fluids above these levels did have cancer. These findings suggest that combined measurement of CEA activity in plasma and pancreatic juice may help in diagnosing pancreatic disease.

1441 INTESTINAL ABSORPTION OF VITAMIN B_{12} IN PATIENTS WITH CHRONIC PANCREATIC INSUFFICIENCY AND THE EFFECT OF HUMAN DUODENAL JUICE ON THE INTESTINAL UPTAKE OF VITAMIN B_{12}. (Eng.) von der Lippe, G.; Andersen, K. J.; Schjonsby, H. (N-5016 Haukeland sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11(7):689-695; 1976.

Studies were carried out to determine whether the reduced vitamin B_{12} absorption observed in patients with chronic pancreatic insufficiency is due to an effect of duodenal juice on the intestinal uptake of intrinsic-factor-bound vitamin B_{12} and to determine whether the absorption of vitamin B_{12} is related to the pancreatic secretion of bicarbonate. The mean absorption of vitamin B_{12} (Schilling test) was 13.1 ± 1.0% in 21 patients with chronic pancreatic insufficiency and 17.6 ± 1.4% in 13 control patients ($p<0.01$). There was no correlation between pancreatic bicarbonate production after secretin stimulation and vitamin B_{12} absorption in the patient group ($r=0.117$). Human duodenal juice reduced the uptake of $^{57}CoB_{12}$-rat intrinsic factor (IF) by perfused rat small intestinal segments *in vivo* ($p<0.01$), as well as the uptake of $^{57}Co_{12}$-human IF by purified guinea pig intestinal brush borders *in vitro* ($p<0.01$). The results confirm reduced absorption of vitamin B_{12} in chronic pancreatic insufficiency, but the mechanism remains uncertain.

1442 CLINICAL ASSESSMENT OF SCINTIGRAPHIC DETECTION OF MOBILITY OF THE PANCREAS. (Eng.) Hiraki, T.; Hisada, K. (Dept. Paramedicine and Nuclear Medicine, Univ. Kanazawa, Japan). *Jpn. J. Nucl. Med.* 12(2):164-165; 1975.

1443 POSTGASTRECTOMY DISTORTION OF THE PANCREATIC DUCTS SIMULATING CARCINOMA. (Eng.) Meakins, J. L.; Stein, L. A. (Royal Victoria Hosp., Montreal, Canada). *Am. J. Roentgenol.* 127(4): 675-677; 1976.

1444 PANCREATIC PSEUDOCYST AS A CAUSE OF GASTROINTESTINAL BLEEDING AND HEMOBILIA. A CASE REPORT. (Eng.) Ro, J. O.; Yoon, B. H; Puppula, A. R. (Veterans Admin. Hosp., N. Chicago, IL 60064). *Am. J. Gastroenterol.* 66(3):287-291; 1976.

See also, 0871, 0983, 1129, 1130, 1217, 1219, 1220, 1221, 1222, 1223, 1226, 1230, 1231, 1251, 1348, 1369, 1379, 1447, 1483, 1636, 1686, 1706.

PANCREAS

Pancreatitis

1445 EXPERIMENTAL MODEL OF PANCREATITIS IN DOGS. (Spa.) Pardo, H. A.; Servetti, E.; Cartazzo, J. M.; Noguera, G.; Bonaba, R. (Departamento de Cirugia, Facultad de Medicina, Av. Gral. Flores 2125, Montevido, Uruguay). *Cir. Urug.* 45(2):174-176; 1975.

A simple procedure for producing acute pancreatitis in dogs is presented. An injection of bile (4-6 cm^3) into the unligated pancreatic duct of 10 anesthetized dogs, produced experimental pancreatitis, as indicated by clinical, laboratory, and anatomopathological observations. Preoperative and postoperative amylase levels were 16-64 U and 128-256 U, resp. All of the dogs died within 12-90 hr. Necropsy revealed pancreatic cytosteatonecrosis, peritoneal serohemorrhagic exudate with digestive or hepatic congestion, and edematous pancreatitis with prenecrotic and necrotic sites. As there was no ligation, this technique lends itself to the evaluation of different therapeutic procedures.

1446 ACUTE PANCREATITIS: ANALYSIS OF FACTORS INFLUENCING SURVIVAL. (Eng.) Jacobs, M. L.; Daggett, W. M.; Civetta, J. M.; Vasu, M. A.; Lawson, D. W.; Warshaw, A. L.; *et al.* (Massachusetts General Hosp., Fruit St., Boston, MA 02114). *Ann. Surg.* 185(1):43-51; 1977.

To identify factors that distinguish patients with acute pancreatitis (AP) who can be expected to respond poorly to conservative measures from the entire patient population, a retrospective analysis of 519 cases of AP occurring over a 5-yr period was undertaken. Thirty-one percent of these patients had a history of alcoholism, and 47% had a history of biliary disease. The overall mortality was 12.9%. Of the symptoms recorded at the time of admission, hypotension, tachycardia, fever, abdominal mass, and abnormal examination of the lung fields correlated positively with increased mortality. Seven features of the initial laboratory examination correlated with increased mortality. Shock, massive colloid requirement, hypocalcemia, renal failure, and respiratory failure requiring endotracheal intubation were complications associated with the poorest prognosis. Among patients in this series with three or more of these clinical characteristics, maximal nonoperative treatment yielded a survival rate of 29%, compared to the 64% survival rate for a group of patients treated operatively with cholecystostomy, gastrostomy, feeding jejunostomy, and sump drainage of the lesser sac and retroperitoneum. High risk patients may benefit from early surgical intervention.

1447 ACUTE PANCREATIC PSEUDOCYSTS: INCIDENCE AND IMPLICATIONS. (Eng.) Bradley, E. L., III; Gonzalez, A. C.; Clements, J. L., Jr. (Emory Univ. Sch. Medicine, 69 Butler St., Atlanta, GA 30303). *Ann. Surg.* 184(6):734-737; 1976.

Attempts were made to define an acute pseudocyst, and to gain further information on the diagnosis and management of this entity. Of 92 patients with moderately severe acute pancreatitis initially studied within 3 weeks of onset by ultrasonic tomography, 52 developed an acute fluid collection in the lesser sac. Documentation of the ultrasound prediction of pseudocyst was achieved by surgery or autopsy in 26 cases. Spontaneous resolution of the acute pseudocyst was demonstrated by serial ultrasonography and radiography in another 10 patients. Exploration exposed three false-positive predictions of pseudocyst. Eleven other patients with a cystic configuration either refused surgery or were lost to follow-up. Acute pseudocyst formation is a relatively common phenomenon in the early phases of moderately severe pancreatitis. While spontaneous resolution of acute pseudocysts is frequent, in approximately 50% of cases, acute pseudocysts progress to chronic pseudocysts. A distinction between acute and chronic pseudocyst is necessary, since specific surgical management depends upon the phase of pseudocyst development. Unless regional sepsis supervenes, acute pseudocyst of less than 3 weeks' duration may be followed by serial ultrasonography in the hope of spontaneous resolution. When a pseudocyst has achieved chronic status, spontaneous resolution is rare. Persistent conservative management under these conditions invites the excessive mortality and morbidity of spontaneous rupture.

1448 ACUTE RENAL FAILURE IN PATIENTS WITH ACUTE PANCREATITIS. (Eng.) Goldstein, D. A.; Llach, F.; Massry, S. G. (Los Angeles County-

Univ. Southern California Medical Center, Los Angeles, CA). *Arch. Intern. Med.* 136(12): 1363-1365; 1976.

The cases of five patients with acute pancreatitis in whom acute renal failure developed in the absence of hypotension are described. Pancreatitis was diagnosed clinically, with mean serum and urinary amylase levels of 766 ± 197 and 2,378 ± 572 U/100 ml, resp. Acute renal failure developed within 24 hr after admission in all patients. It was manifested by oliguria, elevated levels of serum creatinine (6.9 ± 1.1 mg/100 ml) and blood urea nitrogen (105 ± 28 mg/100 ml); a urinary sodium level of 72.0 ± 6.6 mEq/l; and an isosmotic urine level of 355 ± 31 mOsm/l. The mean uric acid level was 18.6 ± 1.6 mg/100 ml. The lowest mean diastolic blood pressure was 96 ± 6 mm Hg. The duration of the oliguric phase of acute renal failure was 8.2 ± 1.7 days, and all patients recovered from both the acute pancreatitis and acute renal failure. Acute pancreatitis, *per se*, can precipitate acute renal failure. It occurs early in the course of the pancreatitis, and extreme hyperuricemia is a frequent finding that does not adversely affect the recovery of renal function.

1449 ACUTE PANCREATITIS IN SZCZECIN CLINICS AND HOSPITALS IN THE YEARS 1964-1974. EPIDEMIOLOGY, SYMPTOMATOLOGY AND CLINICAL PICTURE. (Pol.) Kopylow, A.; Majewska, M.; Synoradzka, K.; Kaczmarek, W.; Marlicz, K.; Zajac, J. (Klinika Chorob Wewnetrznych I.Ch.W. PAM, ul. Unii Lubelskiej 1, 71-344 Szczecin, Poland). *Przegl. Lek.* 33(2): 298-302; 1976.

1450 EVALUATION OF EXPERIMENTAL CANINE PANCREATITIS. (Eng.) Traverso, L. W.; Longmire, W. P., Jr.; Tompkins, R. K. (UCLA Sch. Medicine, Los Angeles, CA 90024). *J. Surg. Res.* 21(4):247-253; 1976.

1451 LIPOPROTEIN LIPASE ACTIVITY AND POSTHEPARIN LIPOLYTIC ACTIVITY (PHLA) INHIBITOR LEVEL IN ACUTE PANCREATITIS. (Pol.) Kinalska, I.; Gabryelewicz, A.; Langiewicz, J. (Klinika Gastroenterologii Instytutu Chorob Wewnetrznych AM, ul. M. Curie Sklodowskiej 24a, Bialystock, Poland). *Przegl. Lek.* 33(2):311-315; 1976.

1452 SERIOUS BLEEDING COMPLICATIONS IN CASES OF CHRONIC PANCREATITIS. (Eng.) Bodner, E. (Clinic Surgery, Univ. Innsbruck, Innsbruck, Austria). *Abdom. Surg.* 18(10):227-229; 1976.

See also, 1202, 1225, 1227, 1228, 1229, 1231, 1440, 1707.

LIVER AND BILIARY TRACT

1453 INFUSION HEPATIC ANGIOGRAPHY IN DIAGNOSIS OF LIVER METASTASES. (Eng.) Rosch, J.; Freeny, P.; Antonovic, R.; Gutierrez, O. H. (Univ. Oregon Health Science Center, 3181 Sam Jackson Park Road, Portland, OR 97201). *Cancer* 38(6): 2278-2286; 1976.

Experience with infusion hepatic angiography and with conventional angiography is presented, and the diagnostic effectiveness of the two techniques is compared. Infusion hepatic angiography was used, together with conventional angiography, diagnostically in 68 patients with liver metastases. The combination of both techniques led to a diagnostic accuracy of 97%. Metastases were missed in only two patients, both of whom had underlying liver or biliary disease. In a comparison of the two techniques, infusion angiography was diagnostically essential in 5 patients (7%) and afforded improved diagnosis in 49 others (72%). In 10 patients (15%), it gave equivalent information; and in 4 patients (6%), it provided less information than the conventional technique. Infusion hepatic angiography is a useful complementary technique in anatomic liver diagnosis, especially because of its ability to improve upon the diagnostic accuracy of the capillary phase of hepatic angiography.

1454 CORRELATION OF SCINTIGRAPHY WITH SHORT INTERVAL AUTOPSY IN MALIGNANT FOCAL LIVER DISEASE, A STUDY OF 59 CASES. (Eng.) Ruiter, D. J.; Byck, W.; Pauwels, E. K.; Taconis, W. K.; Spaander, P. J. (Pathologisch Laboratorium der Rijksuniversiteit, Boerhaavekwartier, Wassenaarseweg 62, Leiden, Netherlands). *Cancer* 39(1):172-177; 1977.

The accuracy of scintigraphy was evaluated by comparing scintigraphy and autopsy findings in 59 patients: 56 with malignant diseases (carcinoma, 44; sarcoma, 2; lymphoma, 8; other, 2) and 3 with nonmalignant diseases (duodenal ulcer, myelofibrosis with peliosis hepatitis, and rheumatoid arthritis with vasculitis and cachexia). Autopsy was performed within a few weeks of scintigraphy, and the number of focal lesions, percentage of liver affected, and weight of the liver and spleen were also compared. The overall accuracy of scintigraphy was 49/59 cases, with 4/26 false-positive and 6/33 false-negative reports. Five of the 10 cases with lesions ≤ 2.5 cm were missed, compared to 1/23 cases with a larger lesion ($p<0.03$). No lesion >4 cm was missed. Incorrect interpretation was almost always made in patients with a liver weighing <2,000 g (9/30); accuracy was much higher in 28/29 patients with heavier livers ($p<0.0025$). Detection of a single focal lesion by scintigraphy was unreliable (2/13). The correlation between the spleen weight calculated from the scintigram and that found at autopsy was poor, but the correlation between both liver weights was more satisfactory.

1455 EFFECTS OF EXPERIMENTAL HEPATIC ARTERY EMBOLIZATION ON HEPATIC FUNCTION. (Eng.)

Cho, K. J.; Reuter, S. R.; Schmidt, R. (Univ. Michigan Medical Center, Ann Arbor, MI 48109). *Am. J. Roentgenol.* 127(4):563-567; 1976.

The effect of embolization on hepatic function was evaluated in 12 dogs. Embolization of the hepatic artery was effected with Gelfoam. Liver function studies, including SGPT, alkaline phosphatase, BSP test, and bilirubin, were done serially over a 6-week period following the embolization. Eleven of the 12 dogs survived the 6-week period. Hepatic artery embolization caused some liver damage; however, recovery occurred by 6 weeks. These results suggest a possible therapeutic role for hepatic artery embolization in patients with massive hepatic bleeding or hemobilia who are not surgical candidates and who would require hepatic lobectomy or dearterialization to control the bleeding.

1456 SERUM BILE ACID CONCENTRATIONS IN PATIENTS WITH LIVER DISEASE. (Eng.)

Fausa, O.; Gjone, E. (Medical Dept. A, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(5):537-543; 1976.

Fasting and 2-hr postprandial serum bile acid concentrations were determined in 49 patients with various liver diseases by an enzymatic-fluorimetric method, using a highly purified 3α-hydroxysteroid dehydrogenase. Twenty-two patients had cholestatic hepatobiliary diseases (CHD; extrahepatic occlusion, primary biliary cirrhosis, and biliary tract diseases in ulcerative colitis), and 21 patients had predominantly parenchymatous diseases (PD; chronic active hepatitis and liver cirrhosis). Fasting bile acid concentrations were elevated (≤ 7.5 mM) in all patients with serum bilirubin >1.0 mg/dl and in seven with normal bilirubin. In both patient groups, however, the levels correlated significantly to bilirubin ($p<0.001$ for CHD patients, $p<0.01$ for PD patients) and to SGOT ($p<0.05$), but not to SGPT, alkaline phosphatase, or albumin. Postprandial concentrations were above normal (≥ 10.0 μM) in all CHD patients with biochemical and/or histological signs of cholestatic disease, even if fasting concentrations were normal. In PD patients, postprandial concentrations correlated significantly with bilirubin ($p<0.01$) and with SGOT and SGPT ($p<0.02$), but not with alkaline phosphatase or albumin. Fasting and postprandial serum bile acid concentrations tended to be a more sensitive test of hepatobiliary disease than bilirubin and the transaminases in both patient groups.

1457 INVESTIGATIONS OF THE ACTIVITY OF ARYLSULPHATASE A AND B IN LIVER TISSUE AND SYSTEMATIC FLUIDS IN SELECTED DISEASES OF THE LIVER AND BILE DUCTS. (Pol.)

Wieczorek, E. (61-047 Poznan, ul. Warszawska 106, Poland). *Pol. Przegl. Chir.* 47(9):1081-1086; 1975.

A comparative study of the activity of arylsulfatase A and B in serum, liver, and urine as a diagnostic criterion in some liver and biliary tract diseases is presented. The patients (117) were divided into four groups: group 1 consisted of 52 patients with gallbladder stones; group 2 contained 20 patients with gallstone-induced jaundice; group 3 was composed of 12 patients with neoplasm-induced icterus; and group 4 had 17 controls without liver or biliary tract symptoms. Mean arylsulfatase A and B values in the liver, serum, and urine of the first three groups were higher than those in the control group. They were highest in the urine and blood serum of patients with neoplastic jaundice and extrahepatic cholelithiasis. Increased arylsulfatase A and B activity in serum coincided with higher alkaline phosphatase levels, along with other results indicating liver damage. It was also shown that arylsulfatase A and B ratio in liver tissue and blood serum was higher than 1 in all groups, except in neoplastic jaundice (0.89) and primary liver tumor (0.66). Determination of this ratio might be utilized for differentiation of benign and malignant types of jaundice.

1458 ICTERIC TYPE HEPATOMA. (Eng.)

Lin, T. Y; Chen, K. M.; Chen, Y. R.; Lin, W. S. J.; Wang, T. H.; Sung, J. L. (Natl. Taiwan Univ. Hosp., Taipei, Taiwan, R.O.C.). *Med. Chir. Dig.* 4(5/6):267-270; 1975.

Clinical and surgical findings in eight cases of icteric hepatoma are reported, and the case history of one of these patients is presented. All patients had a history of biliary stone-like attacks and jaundice. Because this tumor invades and ruptures the bile duct before it is discernable, the diagnosis was established only by histologic examination of an evacuated blood clot or necrotic tissue obtained from the bile duct at operation.

1459 SOME PARAMETERS OF SERUM ENZYME ACTIVITY IN PATIENTS WITH A MALIGNANT PROCESS OF THE LIVER. (Cro.)

Roguljic, A.; Kolaric, K.; Petrinovic, R. (Central Inst. Tumors and Similar Diseases, Zagreb, Yugoslavia). *Acta Med. Iugosl.* 29(2):177-184; 1975.

To test the value of serum enzyme activity in the early diagnosis of malignant processes in the liver, serum alkaline phosphatase, total and liver lactate dehydrogenase, GOT, GPT, and γ-glutamyltranspeptidase levels were studied in 10 men and 15 women with malignant processes in the liver (principally carcinoma) with different primary localizations. The malignant process was cytopathohistologically verified in all patients. γ-Glutamyltranspeptidase, liver lactate dehydro-

enase, and alkaline phosphatase levels were
ignificantly elevated, giving a positive
iagnosis in 100%, 96%, and 84% of the studied
atients, resp. ^{198}Au-scintigraphy of the liver,
owever, showed a positive diagnosis in only 67%
f the patients examined. Serum levels of certain
nzymes can thus be valuable in diagnosing malignant
rocesses in the liver, but since elevated enzyme
evels may also accompany other liver diseases,
omparative data should be collected.

460 TREATMENT OF SYMPTOMATIC HEPATIC CYST BY PERCUTANEOUS INSTILLATION OF PANTO-
QUE. (Eng.) Goldstein, H. M.; Carlyle, D. R.;
lson, R. S. (M. D. Anderson Hosp. and Tumor
st., Houston, TX 77030). *Am. J. Roentgenol.*
7(5):850-853; 1976.

e case of a 57-yr-old man in whom the percutaneous
stillation of isophendylate was used in the manage-
nt of a large, symptomatic, simple hepatic cyst
presented. The lesion was diagnosed by ^{99m}Tc
lfur colloid liver scan, hepatic arteriography,
trasonography, and puncture and radiography of
e cyst. In an attempt to sclerose the cyst,
ophendylate (9 ml) was injected. Subsequent
alysis of the cystic fluid revealed the presence
occult blood and a cholesterol level of 115 mg/100
, a bilirubin level of 2.5 mg/100 ml, and an LDH
vel of 715 mU/100 ml. Six months later, plain
diographs demonstrated evidence of a fibrous
action within the cyst, and the cyst was no longer
parent on ultrasonography. Sixteen months after
ncture, the patient remains asymptomatic, and the
diographs remain unchanged. These results suggest
at percutaneous instillation of sclerosing agents
y provide an alternative to operative procedures
the management of hepatic cyst.

61 PATHOLOGY OF LIVER TRANSPLANTATION. (Eng.) Roddy, H.; Putnam, C. W.; Fennell, R. H.,
. (Univ. Colorado Medical Sch., Denver, CO 80220).
nsplantation 22(6):625-630; 1976.

erience with 76 liver transplantations in 67
ients is reviewed in an attempt to ascertain
ses of failure and to aid in setting guidelines
better results. Previous experience with renal
nsplantation indicates failure of the graft is
ally due to immunological rejection; in the
sent sample, rejection was the primary cause of
ft failure in only 4 of the 64 cases in which
graft survived the first postoperative week.
two most common causes of transplant failure
e technical difficulties with the operative
cedure and sepsis; these accounted for 47 (62%)
ft failures in 76 transplants. Biliary obstruc-
n and sepsis are more common causes of liver
lure than rejection, and patients with recurrent
ndice are now studied intensively for evidence
obstruction. Only after obstruction is excluded
immunosuppression intensified. The future of
er transplantation in the management of potential-
fatal liver disease appears to be encouraging.

1462 CHRONIC INTRAHEPATIC CHOLESTASIS OF SARCOIDOSIS. (Eng.) Rudzki, C.; Ishak, K. G.; Zimmerman, H. J. (George Washington Univ. Sch. Medicine, Washington, DC). *Am. J. Med.* 59(3): 373-387; 1975.

The clinical, biochemical, immunologic, and histologic findings in five men with sarcoidosis and jaundice in whom a syndrome resembling primary biliary cirrhosis developed are described. The average age of the onset of symptoms was 27 yr. Results of the tuberculin test were negative in four of five cases. Hepatomegaly and splenomegaly were present in all. Failure of normal lymphocyte transformation by phytohemagglutinin was seen in one of the three tested, and another had a borderline response. Causes other than sarcoidosis for granulomatous disease could not be demonstrated. Insidious onset of pruritus and jaundice, and strikingly elevated levels of serum alkaline phosphatase, were seen in all five patients. Histologic features characteristic of primary biliary cirrhosis included a decrease in the number of portal bile ducts and increased amounts of copper in hepatocytes. Therapeutic efforts included glucocorticoids, chloroquine, and phenobarbital; the patients survived from 7 to 18 yr after onset. Portal hypertension was present in three patients. Clinical features of disseminated granulomatous disease consistent with sarcoidosis preceded or were prominent features of chronic intrahepatic cholestasis. The data indicate a diagnosis of sarcoidosis concomitant with chronic intrahepatic cholestasis.

1463 WILSON DISEASE. COMPARATIVE ULTRASTRUCTURE IN A SIBSHIP OF NINE. (Eng.) Lough, J.; Wiglesworth, F. W. (Montreal General Hosp., 1650 Cedar Ave., Montreal, Quebec, Canada). *Arch. Pathol. Lab. Med.* 100(12):659-663; 1976.

Comparative electron microscopy was carried out on liver tissue from nine siblings to determine whether presymptomatic, affected patients with Wilson's disease could be differentiated from heterozygous, normal carriers. Two of the nine developed the neurologic manifestations of the disease; three others were considered homozygous, but normal; two were heterozygous and normal; and two were classified as genotypically uncertain, because of borderline biochemical abnormalities. Alterations of the mitochondria and endoplasmic reticulum suggestive of copper toxicity were present in both the heterozygous and the genotypically uncertain siblings. Variation in size and shape of the mitochondria, dilation of smooth endoplasmic reticulum, and greatly enhanced autophagolysosomal activity, with digestion of mitochondria and accelerated production of lipofuscin-laden residual bodies, were seen. A clear distinction could not be made. The severity of the abnormalities appeared to correlate with liver copper level, and organelle changes preceded lipid accumulation.

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1470 BACTERIAL, VIRAL AND AUTO ANTIBODIES IN ACUTE AND CHRONIC LIVER DISEASES. (Eng.) Triger, D. R. (Professorial Medical Unit, Univ. Southampton, Southampton, U.K.). *Ann. Clin. Res.* 8(3):174-181; 1976.

1471 PATTERN OF LIVER DISEASES IN CHILDREN. A BIOPSY STUDY. (Eng.) Raju, G. C.; Reddy, D. B.; Suvarnkumari, G. (Kurnool Medical Coll., Kurnool 518002, Andhra Pradesh, India). *Indian J. Pediatr.* 42(325):39-45; 1975.

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1475 LACK OF GALLIUM UPTAKE IN PRIMARY HEPATIC AMYLOIDOSIS. (Eng.) Goergen, T. G.; Taylor, A.; Alazraki, N. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Am. J. Roentgenol.* 126(6):1246-1248; 1976.

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HEPATITIS AND PRIMARY BILIARY CIRRHOSIS
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1496 PRURITUS OF PREGNANCY AND JAUNDICE INDUCED BY ORAL CONTRACEPTIVES. (Eng.) Medline, A.; Ptak, T.; Gryfe, A.; Blenkinsop, B. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario, Canada M5T 2S8). *Am. J. Gastroenterol.* 65(2): 156-158; 1976.

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1499 REYE'S SYNDROME: PATHOLOGICAL STUDY OF TWO CASES. (Fre.) Pagis de Micco, C.; Chapoy, P.; Perimond, H.; Lebreuil, G. (C.H.U., 13326 Marseille Cedex 3, France). *Sem. Hop. Paris* 51(13):891-899; 1975.

1500 VIRAL CRYSTALLINE ARRAYS IN REYE'S SYNDROME [Abstract]. (Eng.) Mendoza, M.; Alvira, M. M.; Smith, R. D. (Cincinnati General Hosp., Cincinnati, OH 45267). *Am. J. Clin. Pathol.* 65(2):262-263; 1976.

1501 LIVER IN REYE'S SYNDROME (RS): NORMAL K_m OF MITOCHONDRIAL UREA CYCLE ENZYMES (CPS, OTC) AND FAILURE OF A 4-PENTENOIC ACID (PA) TO ACCOUNT IN VITRO FOR THE TRANSIENT REDUCTION OF ACTIVITY OF THE TWO ENZYMES IN VIVO [Abstract]. (Eng.) Brown, T.; Hug, G.; Lansky, L.; Bove, K.; Schubert, W. (Dept. Pediatrics, Univ. Cincinnati, Cincinnati, OH). *Pediatr. Res.* 10(4):352; 1976.

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1503 TOXICITY TO WHITE MICE OF CORN NATURALLY CONTAMINATED WITH AFLATOXIN. (Eng.) Lindenfelser, L. A.; Lillehoj, E. B.; Sansing, G. A. (Res. and Development Div., Commercial Solvents Corporation, Terre Haute, IN 47808). *J. Agric. Food Chem.* 24(1):198-200; 1976.

1504 HEPATOTOXICITY: A BASIS FOR THE DELAYED FATAL TOXICITY OF 4'-DEMETHYL EPIPODOPHYLLOTOXIN-β-D-THENYLIDENE GLUCOSIDE (VM26) IN MICE [Abstract]. (Eng.) Hacker, M. P. (Univ. Tennessee Center Health Sciences, TN). *Diss. Abstr. Int.* [*B*] 36(8):3900-B; 1976.

See also, 0862, 0902, 1160, 1161, 1165, 1167, 1168, 1169, 1173, 1181, 1183, 1197, 1202, 1204, 1205, 1206, 1207, 1209, 1210, 1211, 1212, 1214, 1215, 1223, 1239, 1243, 1244, 1245, 1246, 1247, 1249, 1250, 1294, 1378, 1426, 1512, 1544, 1563, 1570, 1576, 1590, 1602, 1603, 1605, 1634, 1635, 1653, 1654, 1659, 1689, 1694, 1709, 1715, 1716, 1724, 1725, 1727.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

1505 ETHNIC DIFFERENCES IN NEONATAL JAUNDICE: COMPARISON OF JAPANESE AND CAUCASIAN NEWBORN INFANTS. (Eng.) Horiguchi, T.; Bauer, C. (Coll. Physicians and Surgeons, Columbia Univ., 630 W. 168th St., New York, NY 10032). *Am. J. Obstet. Gynecol.* 121(1):71-74; 1975.

A statistically significant increased incidence of neonatal jaundice among 75 Japanese infants born in New York, compared to 50 Caucasian infants born during the same period, is reported. The incidence in the Japanese infants was 57%, compared to 16% in the Caucasian group. The groups were comparable in terms of antenatal and intrapartum care, maternal age, parity, intrapartum medication, type of delivery, and anesthesia. Hyperbilirubinemia exceeding 15 mg% was observed in 23% of the Japanese infants and in none of the Caucasian group. Special attention to this type of jaundice in patients of Oriental origin by obstetricians and pediatricians is urged.

1506 CLINICAL EFFECTS OF MEDICATION ON CONSTITUTIONAL JAUNDICE: STUDIES ON THE EFFECT OF BUCOLOME ON GILBERT'S SYNDROME AND DUBIN-JOHNSON SYNDROME. (Jpn.) Yamamoto, T.; Kosaka, K.; Ichida, F.; Kanetaka, T.; Kameda, H.; Namihisa, T.; *et al.* (Kliniki Univ. Sch. Medicine, Japan). *Jpn. Arch. Int. Med.* 21(12):427-437; 1974.

The effectiveness of bucolome in reducing serum bilirubin was studied in 30 cases of Gilbert's syndrome and 15 cases of Dubin-Johnson syndrome. Bucolome (300-mg capsules) was administered p.o. three times a day for 4 weeks. Medication levels were increased to 1,200 or 1,800 mg/day in 11 cases. Serum bilirubin levels were measured continuously from one month before administration of the drug to one month after its discontinuation. In 21/30 cases of Gilbert's syndrome, serum bilirubin concentration decreased by more than 1.5 mg/dl, or by more than 50% of the original level. In the remaining 9 cases, 7 showed decrease in the range of 0.5-1.4 mg/dl, and 2 cases decreased by less than 0.4 mg/dl. No increases in serum bilirubin occurred during administration of bucolome. Ameliorating effects on jaundice were evident in 21/30 cases, from external observation. Out of 22 patients followed after discontinuation of the drug, serum bilirubin returned to pretreatment levels after several weeks in 11 cases. In 4/15 cases of Dubin-Johnson syndrome, maximum serum bilirubin decreases of 18-35% occurred, but results were unclear. Bucolome seemed ineffective in Dubin-Johnson syndrome. Side effects, all of which disappeared after discontinuation of the drug, included gastrointestinal disorders (7), rash (1), itching (1), and speech and sight impairment (1)

1507 KINETICS AND METABOLISM OF ^{131}I-BSP IN PATIENTS WITH DUBIN-JOHNSON'S AND ROTOR'S SYNDROMES [Abstract]. (Eng.) Perisic, V.; Ratkovic, M.; Grbic, R.; Kostic, K. (Internal Clinic A, Medical Faculty, Beograd, Yugoslavia). *Digestion* 14(5/6):534; 1976.

1508 ROTOR'S SYNDROME: EVIDENCE FOR AN IMPAIRMENT OF HEPATIC UPTAKE AND STORAGE OF CHOLEPHILIC ORGANIC ANIONS [Abstract]. (Eng.) Dhumeaux, D.; Delage, Y.; Levy, V. G.; Hadchouel, P.; Saigot, T. (Hopital Saint-Antoine, Creteil, France). *Digestion* 14(5/6):505-506; 1976.

See also, 1218.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

1509 TUBERCULOUS PSEUDOTUMORS OF THE LIVER. (Eng.) Zipser, R. D.; Rau, J. E.; Ricketts, R. R.; Bevans, L. C. (Los Angeles County—Univ. Southern California Medical Center, 1200 N. State St., Los Angeles, CA 90033). *Am. J. Med.* 61(6): 946-951; 1976.

A rare case of tuberculous pseudotumors of the liver occurred in a 35-yr-old man who presented with a 6-week history of daily fever, night sweats, malaise, and a 20-pound weight loss and with a 5-month history of adenopathy in the neck. Results of liver function studies were nonspecific and common to most space-occupying lesions: transaminase and bilirubin levels were normal, alkaline phosphatase was moderately increased, albumin decreased, globulin increased, and prothrombin time was slightly prolonged. Liver scan disclosed numerous filling defects in the liver, with a mild increased bone marrow uptake. Therapy with isoniazid and ethambutol was begun, with no real improvement, and a laparotomy was performed. The liver surface contained multiple nodules, varying in diameter from 2 mm to 5 cm; numerous firm para-aortic nodes approximately 2 cm in diameter and a firm mass in the head of the pancreas were also found. The initial impression was metastatic carcinoma, possibly of pancreatic origin. However, on the fourth postoperative day, acid-fast stains confirmed the presence of tuberculous bacilli in the liver tissue, and rifampin was added to the antibiotic regimen. The response to antituberculous drug therapy was rapid. *Mycobacterium tuberculosis* was identified 2 weeks later from liver tissue culture. Unusual presentations of metastatic carcinoma to the liver should be thoroughly investigated with pathologic and bacteriologic studies, and tuberculous pseudotumors should be considered.

1510 LIVER FUNCTION TESTS FOLLOWING ANAESTHESIA. (Eng.) McEwan, J. (Queen Alexandra Military Hosp., Millbank, London, England). *Br. J. Anaesth.* 48(11):1065-1070; 1976.

The effects of halothane and nonhalothane anesthetics on liver function were compared in 41 men undergoing repeated transurethral surgery. All subjects had received multiple halothane anesthetics in the past. On the first occasion, the anesthetic consisted of a sleep dose of thiopentone, followed by 66% nitrous oxide in O_2 and 1%-1.5% halothane reduced to 0.5%-1% by a mask, using a Mapleson A circuit. The nonhalothane anesthetic consisted of thiopentone followed by 80 mg gallamine and ventilation with nitrous oxide (7.5 l/min) and O_2 (2.5 l/min) using an East Autovent nonrebreathing circuit. In both procedures, premedication was with papaveretum and hyoscine. Blood samples were taken before anesthesia and after operation. There was a smaller disturbance of liver function after halothane than after nonhalothane anesthesia. In general, however, alkaline phosphatase values in all patients except one were unchanged. Pyrexia and eosinophilia were absent after operation; no patient was positive for hepatitis B surface antigen, antibody, or antigen-antibody complex. SGOT and SGPT levels were increased more often ($p = 0.05$) after the nonhalothane anesthetic. Increased bilirubin values and altered albumin/globulin ratios occurred in three patients after nonhalothane anesthesia. There was no obvious correlation between altered liver function tests and the number of anesthetics or the total duration of anesthesia. When patients have had more than four previous halothane anesthetics, it may be less upsetting to liver function to continue to use halothane thereafter.

1511 DISEASES OF THE ALIMENTARY SYSTEM: DRUG JAUNDICE. (Eng.) Paton, A. (Dudley Road Hosp., Birmingham B18 7Q11, England). *Br. Med. J.* 2(6043):1126-1127; 1976.

See also, 1239, 1541.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

1512 RADIOHEPATOGRAPHY WITH ^{125}I-ROSE BENGAL IN PATIENTS WITH VIRUS HEPATITIS AND WITH IDIOPATHIC JAUNDICE OF PREGNANCY. (Pol.) Czarnecki, L.; Golba, S.; Neumann, H. (Instytut Chorob Wewnetrznych Sl., ul. Roosevelta 49, 41-902 Bytom, Poland). *Pol. Przegl. Radiol.* 39(5):599-602; 1975.

A comparison of the effectiveness of radiohepatography with ^{125}I-rose bengal (CBI 125) and some liver function tests in viral hepatitis and idiopathic jaundice of pregnancy is reviewed. A group of 79 patients was divided into: group 1, 30 patients without findings of hepatopathy; group 2, 41 patients with viral hepatitis; and group 3, 8 women with idiopathic jaundice of pregnancy. The radioisotope was administered i.v. at 0.2 μCi/kg body weight. All subjects participating in the study received 3 x 15 drops of Lugol's Fluid on the day preceding and 2 days after the isotope injection. Group 2 was examined twice with the radioisotope--at the onset of the disease and at the time of the recession of the clinical symptoms and normalization of biochemical tests performed for all groups. These tests included determination of alanine and asparagine aminotransferases, bilirubin level, iron test, and the γ-globulin level. The capacity of the liver to secrete dye (Te), its capacity to remove dye from the blood (Tu), and the percent of dye in the hepatic blood (R) were determined. It was found that in group 2, Tu lasted nearly twice as long as in group 1 during the first examination, while R amounted to 40 ± 15.6 and 16 ± 3.2, resp. The second test in group 2 during convalescence showed return to standard Tu and R values. In group 3, Tu and R were 42 and 78, resp., which was attributable to intrahepatic cholestasis. Te in groups 2 and 3 indicated considerable liver damage. During viral hepatitis, the radioisotope test proved to be as sensitive and simple as biochemical function tests, but was not useful in the differentiation of viral hepatitis and idiopathic jaundice of pregnancy.

1513 THE STUDY OF HEPATIC STRUCTURE IN VIRAL HEPATITIS. (Eng.) Schaffner, F. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Rush-Presbyt. St. Luke's Med. Bull.* 15(2):123-131; 1976.

Changes in hepatic structure associated with viral hepatitis are reviewed. In acute hepatitis, single hepatocytes or small groups of hepatocytes undergo liquefaction necrosis, which elicits a focal inflammatory response and portal inflammation. Occasiona hepatocytes undergo coagulation necrosis. Electron microscopy reveals that acidophilic "Councilmanlike bodies are dead hepatocytes. Protracted acute lobular hepatitis may progress to more serious chronic disease. Nonspecific structural abnormalities, which include small histocytic nodules, foca necrosis, and portal inflammation, persist as the acute lobular hepatitis heals, but before hepatic function tests return to normal. In chronic portal hepatitis, the inflammation which had extended from the portal tracts into the parenchyma during the acute stage retracts to within the portal tracts, allowing the limiting plates of hepatocytes to restore themselves. When the lobular component of acute hepatitis subsides but the portal and periportal inflammation does not, the resulting chronic periportal hepatitis is called aggressive. The los of hepatocytes in the limiting plate, with resultan inflammation and subsequent fibrosis, is piecemeal necrosis, the *sine qua non* of chronic active hepatitis. Hepatocytes containing hepatitis B surface antigen are larger than normal, because the bulky cytoplasm has a smudged appearance similar to groun or frosted glass. These cells are usually in small groups, with no zonal predilection. Hepatocytes from chimpanzees infected with hepatitis A show clumped endoplasmic reticulum and abnormal mitochondria. Also, large clumps of granules, which ar probably heterochromatin for virus A RNA synthesis, are observed at the peak of the disease. In contra to hepatitis B, the morphological changes seen in hepatitis A last only a week or two; normalcy is then restored.

1514 HISTOPATHOLOGY OF ACUTE AND CHRONIC HEPATITIS. (Eng.) Desmet, V. (Academisch Ziekenhuis Sint-Rafael, Katholieke Universiteit, Kapucijnenvoer 33, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 39(9/10):299-306; 1976.

The histopathological characteristics of acute and chronic hepatitis are surveyed. In acute hepatitis pathological changes occur in the lobular parenchym and portal tracts. The lobular lesions consist of liver cell damage and necrosis, inflammatory cell filtration, development of macrophages, and cholest sis. One striking feature is liver cell pleomorph in which swelling of liver cells, formation of balloon cells, and acidophilic degeneration and format of acidophilic bodies occur. The extent of necros reflects the severity of the disease, and different egrees and patterns can be distinguished: single-ell, focal confluent, intra- and interlobular conluent, panlobular, and multilobular necrosis. Poral changes consist of inflammatory, mainly lymphoytic, infiltration. Chronic hepatitis encompasses broad spectrum of liver disease. It is imperative o distinguish, as far as possible, between chronic epatitis and cirrhosis, and laparoscopy has been elpful in establishing the latter diagnosis. Two ubgroups of chronic hepatitis are chronic persistent epatitis, characterized by portal lymphocytic iniltration, and chronic aggressive hepatitis, which s dominated by more severe portal and periportal nflammation. More active cases go through repeated pisodes of inter- or multilobular confluent parenhymal necrosis, and lesions of the portal bile ducts ay occur.

515 PASSIVE IMMUNIZATION AGAINST VIRAL HEPATITIS—STATUS AND PROSPECTS. (Eng.)
rady, G. F. (State Lab. Inst., 375 South St., oston, MA 02130). *Am. J. Med. Sci.* 270(2):369-74; 1975.

he role of γ-globulin in the development of passive mmunity to viral hepatitis is reviewed. Recent nformation suggests that the potency of anti-hepaitis A γ-globulin will remain high because of the arge blood donor population available. The present ecommended dose is 0.01 ml/lb. In high-risk roups, γ-globulin has been shown to be 80-84% ffective in suppressing hepatitis A. Globulin repared in the last 5 yr has yet to be tested in ommunity outbreaks. The recent identification f the A virus and the development of *in vitro* ests for homologous antibody may provide an adeuate predictive index of clinical effectiveness. nti-hepatitis B globulin prepared from volunteer lasma has shown a rising titer or antibody since 968 when urban epidemics were first noted. In ddition, titers have risen further, possibly ecause routine screening of blood donors has liminated carriers of hepatitis B surface antigen. n nonparenteral exposure to small amounts of noculin, conventional globulin was as effective as pecific, high-titer anti-hepatitis B antisera in ttenuating the infection and decreasing the number f carriers. Hyperimmune globulin has also been hown to be effective in attenuating infection. he prevention of hepatitis B in infants following aternal transmission of antigen is a suggested use or this serum. Prevention of hepatitis B due to ransfusion using donor globulin has met with little uccess. Conventional γ-globulin may be prophylactic n nonparenteral low-dose exposure to hepatitis B. pecific high-titer γ-globulin may be effective in eutralizing antigen from massive exposure.

516 PASSIVE IMMUNOTHERAPY IN HBsAg FULMINANT HEPATITIS: RESULTS ON ANTIGENAEMIA AND JRVIVAL. (Eng.) Gateau, P.; Opolon, P.; usinovici, V.; Ropars, C.; Caroli, J. (Gastroenterlogical Unit, CHU Saint-Antoine, 184, rue Fbg Saintntoine, F-75012 Paris, France). *Digestion* 14(4):)4-310; 1976.

The number of exchange transfusions and the amount of anti-hepatitis B surface antigen (anti-HBs) plasma required to obtain circulating hepatitis B surface antigen (HBsAg) disappearance were investigated. Nineteen patients with HBsAg-positive fulminant hepatitis underwent exchange transfusions and anti-HBs-rich plasma infusions. Circulating HBsAg disappeared in 17 cases: exchange transfusion alone or in combination with one dose of anti-HBs caused the disappearance of circulating HBsAg in 3 and 10 patients, resp. A second exchange transfusion was needed in three patients. The maximal circulating anti-HBs titer detected by radioimmunoassay was higher in the nine patients who showed evidence of liver generation than in the remaining patients (71 ± 24% versus 37 ± 24%). There was no correlation between circulating anti-HBs level and the amount of anti-HBs-rich plasma administered. Recovery was observed in 36% of the cases. As the beneficial effect of such treatment is not yet evident, a controlled trial of patients paired with respect to the number of exchange transfusions and amount of real or placebo anti-HBs should be conducted.

1517 LYMPHOCYTOTOXINS IN ACUTE AND CHRONIC HEPATITIS. CHARACTERIZATION AND RELATIONSHIP TO CHANGES IN CIRCULATING T LYMPHOCYTES. (Eng.)
Dehoratius, R. J.; Henderson, C.; Strickland, R. G. (Jefferson Medical Coll., Philadelphia, PA 19107). *Clin. Exp. Immunol.* 26(1):21-27; 1976.

The lymphocytotoxicity (LCT) in hepatitis serum was characterized, and the relation between LCT and T-cell depression in patients with acute hepatitis (AH) or chronic hepatitis (CH) was determined. Ninety patients were studied: 51 with AH; 29 with CH; and 10 who were asymptomatic carriers of hepatitis B surface antigen (HBsAg), but who had no previous history of icteric hepatitis. LCT against unfractionated lymphocyte target cells was found in 29/51 AH sera, in 21/29 CH sera, and in 0/10 carrier sera, suggesting that there is a relation between LCT and liver damage. LCT was active at physiological temperatures, but maximum cytotoxicity was observed at 15 and 37 C. Sera from AH and CH patients were reactive *in vitro* against cell surface determinants on both T and B cells. Serial determinations of peripheral blood T- and B-cell proportions and LCT were carried out in 21 AH and 14 CH patients. As T-cell proportions returned to normal, LCT decreased. There was a significant negative correlation between percentage change in T-cell levels and percentage change in LCT ($p<0.001$). LCT may be partly responsible for the T-cell depression in AH and CH. Although liver cell damage and/or persistent viral infection could account for the immunological abnormalities, it is suggested that liver damage *per se* is of greater importance.

1518 ENHANCED HBsAb PRODUCTION IN PATHOGENESIS OF FULMINANT VIRAL HEPATITIS TYPE B.
(Eng.) Woolf, I. L.; El Sheikh, N.; Cullens, H.; Lee, W. M.; Eddleston, A. L. W. F.; Williams, R.; Zuckerman, A. J. (King's Coll. Hosp., London SE5 8RX, England). *Br. Med. J.* 2(6037):669-671; 1976.

Sera from 17 patients with fulminant type B hepatitis were compared with those from 20 patients with severe but nonfulminant disease, to investigate the possible importance of humoral immunity in the pathogenesis of fulminant hepatitis. Hepatitis B surface antigen (HBsAg) was cleared from the serum significantly faster ($p<0.001$) in fulminant hepatitis patients. In 41%, anti-HBsAg (HBsAb) was detectable by radioimmunoassay (RIA) at presentation. In all 11 sera from patients with fulminant hepatitis examined by electron microscopy, aggregates of HBsAg and HBsAb were seen. In contrast, HBsAb was never detected by RIA in patients with nonfulminant hepatitis; aggregates were seen by electron microscopy in only one serum specimen (5%). A significant sex difference between fulminant and nonfulminant hepatitis was observed; 65% of the patients with fulminant hepatitis and 15% of the patients with nonfulminant hepatitis were women ($p<0.01$). Enhanced HBsAb production in fulminant hepatitis, by leading to free HBsAb in portal blood, may cause an Arthus reaction in the sinusoids of the liver, with ensuing ischemic necrosis of hepatocytes.

1519 DETECTION OF HEPATITIS B SURFACE ANTIGEN BY MEANS OF ORCEIN STAINING OF LIVER.

(Eng.) Kostich, N. D.; Ingham, C. D. (Clinical Lab., Chicago Ave. at 27th St., Minneapolis, MN 55407). *Am. J. Clin. Pathol.* 67(1):20-30; 1977.

A modified orcein staining method was applied to 65 liver biopsies and to 16 stored paraffin-embedded blocks of liver tissue obtained at autopsy from patients with chronic hepatitis to evaluate its efficacy in detecting hepatitis B surface antigen (HBsAg). In every case, the histologic picture was compared with serologic findings for serum HBsAg. Specimens from all six cases of acute hepatitis were orcein-negative (Or$^-$). Of 33 specimens of chronic persistent hepatitis, 15 were Or$^-$, 5 of these were from HBsAg-seropositive (S$^+$) patients; 18 specimens were Or$^+$, 6 of these were also S$^+$. Of 21 chronic active hepatitis specimens, 16 were Or$^+$ (6 also S$^+$) and 5 were Or$^-$ (1 also S$^+$); of 5 cases of primary biliary cirrhosis, 3 were Or$^-$ and 2 were Or$^+$; all were S$^-$. The results appear to support the concept of an inverse relationship between the severity of liver cell damage and the titer of circulating HBsAg. A positive stain may be of value in distinguishing acute from chronic hepatitis when histologic changes are minimal. However, the total of 36 Or$^+$ cases compared with 18 S$^+$ cases make further evaluation necessary. Results with stored autopsy material suggest that the stain may be used in determining the etiology of cirrhosis. Inclusion bodies seen in hepatomas were Or$^+$, indicating that they contain, or are related to, HBsAg.

1520 DISTRIBUTION PATTERNS OF HEPATITIS B SURFACE ANTIGEN (HBsAg) IN THE LIVER BIOPSIES OF HEPATITIS B PATIENTS.

(Eng.) Ray, M. B.; Desmet, V. J. (Academisch Ziekenhuis Sint-Rafael, Katholieke Universiteit, Kapucijnenvoer 33, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 39 (9/10):307-317; 1976.

The pathogenesis and development of various divergent morphological types of liver diseases associated with hepatitis B antigenemia were studied. Using indirect immunofluorescence on the liver biopsies of hepatitis B patients, four main distribution patterns of hepatitis B surface antigen (HBsAg) were observed: full cytoplasmic fluorescence with diffuse lobular distribution; cytoplasmic fluorescence with spotty distribution; fluorescence in the cell membrane and/or cell peripheries; and focal cytoplasmic positivity. These various expression patterns of HBsAg could be integrated into each type of chronic and acute hepatitis B. Strong, full cytoplasmic fluorescence distributed diffusely in the liver lobules was observed in histologically near-normal liver, chronic persistent hepatitis, and inactive cirrhosis. This corresponded with the presence of groundglass hepatocytes in the biopsies. Membrane-localized HBsAg was minimal or absent in those conditions. HBsAg specific fluorescence in the liver cell membranes and/or peripheral cytoplasm with cytoplasmic fluorescence in a lower number of hepatocytes, was observed in chronic aggressive hepatitis, active cirrhosis, and acute hepatitis with possible transition to chronicity. HBsAg was rarely detected in the liver of patients with acute hepatitis, despite its presence in the blood. These distinctive expression patterns of HBsAg in the liver may fortify the diagnosis of various histologic types of hepatitis B and may indicate an interaction of both hepatitis B virus and host immune response in the pathogenesis of hepatitis B.

1521 NON-A, NON-B HEPATITIS.

(Eng.) Purcell, R. H.; Alter, H. J.; Dienstag, J. L. (Natl. Inst. Allergy and Infectious Diseases, Natl. Inst. Health, Bldg. 7, Room 202, Bethesda, MD 20014). *Yale J. Biol. Med.* 49(3):243-250; 1976.

The epidemiology and clinical characteristics of type non-A, non-B hepatitis are reviewed. Type non-A, non-B hepatitis was first identified in transfused patients. At present, as much as 90% of transfusion-associated hepatitis appears to be type non-A, non-B. The epidemiology of type non-A, non-B hepatitis resembles more closely that of type B hepatitis than that of type A disease. The average incubation period of type non-A, non-B hepatitis appears to be 6-7 weeks shorter than that of type B hepatitis. Type non-A, non-B hepatitis is less acutely severe than type B disease, resulting in a lower proportion of icteric cases and a lower mean maximum SGPT value. Elevation of SGPT values persisting for 6 or more months has been observed more frequently following non-A, non-B hepatitis than following type B hepatitis. In some cases of chronic non-A, non-B hepatitis, periods of transaminase elevation alternate with periods of normal or near normal transaminase activity; these cyclic patterns appear to occur more frequently in chronic non-A, non-B hepatitis than in chronic type B disease Attempts to identify an antigen specific for non-A, non-B hepatitis or to transmit the disease to nonhuman primates have been unsuccessful. Seroepidemiologic evidence indicates that two or more agents may be responsible for non-A, non-B hepatitis. The most effective means of preventing transfusion-associated non-A, non-B hepatitis is the substitution of blood derived from volunteer sources for commercial blood.

1522 VA COOPERATIVE STUDY OF POST-TRANSFUSION HEPATITIS, 1969-1974: INCIDENCE AND CHARACTERISTICS OF HEPATITIS AND RESPONSIBLE RISK FACTORS. (Eng.) Seeff, L. B.; Zimmerman, H. J.; Wright, E. C.; McCollum, R. W. (Veterans Admin. Hosp., 50 Irving St., Washington, DC 20422). *Am. J. Med. Sci.* 270(2):355-362; 1975.

The results of a 6-yr randomized, double-blind study of the incidence, characteristics, and risk factors of post-transfusion hepatitis, using the data from 2,788 patients, are presented. Patients were studied by biochemical and serologic tests within 4 days of transfusion and were followed regularly for 6 months. Tests for hepatitis B surface antigen (HBsAg) were also performed. Minimal diagnostic criteria were set. Patients received two doses of either α-globulin or a placebo. The average number of transfusions received by each patient was 3.4, and 63.2% of the blood was of paid-donor origin. Hepatitis occurred in 316 patients (11.3%). Sixty-two of these were icteric. Retrospective screening of transfused blood by radioimmunoassay showed 0.5 to 1.7% to be HBsAg positive. Thirty-five percent of the patients developed hepatitis of 2 to 6 weeks incubation, and 31% had disease of 13 weeks duration. Duration was unaffected by receipt of immune globulin. The risk of hepatitis increased with the number of paid blood units transfused, yet was independent of the number of volunteer units used. Hepatitis B was significantly more frequent in recipients of HBsAg positive blood (14.9%) than in recipients of either antibody-containing (4.8%) or negative (2.5%) blood. Development of all forms of hepatitis was higher in both antigen and antibody recipients than in negative recipients, suggesting a higher rate of non-B infection with antibody-containing blood than with negative blood. Conversion from the use of commercial donor blood to volunteer donor blood decreased the incidence from 20.8 to 6.2% in one hospital studied. Sensitive screening methods have not decreased the incidence of hepatitis. An additional, undefined agent may be responsible for most instances of post-transfusion hepatitis, and the use of commercial donor blood is the most important factor in the development of hepatitis.

1523 RESEARCH INTO CONDITIONS AFTER VIRAL HEPATITIS. (Slo.) Weisz, P.; Niederland, T. R.; Zacharova, M.; Cervenka, J. (III interna klinika, LF KU NsP akademika, Februaroveho vitazstva 163 P.W., 800 00 Bratislava, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(4):225-232; 1975.

Subjective complaints, hepatomegaly, and certain biochemical indices were studied in 182 men and 191 women who had viral hepatitis 10-13 yr previously. The patients were divided into two groups: those whose anamnesis did not show any etiological factors other than viral hepatitis, which might have affected the studied parameters, and those whose anamnesis did show such additional factors. Less than 25% of all the patients had subjective complaints, and such complaints were more often observed in the second group than in the first. Hepatomegaly and pathological laboratory test results (hyperbilirubinemia, elevated GPT activity, elevated BSP retention, and hypergammaglobulinemia) were also more frequent in the second group. Only elevated alkaline phosphatase activity occurred more often in the first group, which may have been a result of the age and sex of those showing elevated levels of this enzyme (preponderance of young men). Studies on long-term sequelae of viral hepatitis are complicated by the difficulty of obtaining data on patients after long periods of time. Only about 20% of the patients contacted were included in this study.

1524 VIRAL HEPATITIS--A PRIMER: 1. EPIDEMIOLOGY. (Eng.) Bryan, J. A.; Pattison, C. P. (Center Disease Control, Atlanta, GA 30333). *Postgrad. Med.* 59(1):66-74; 1976.

1525 VIRAL HEPATITIS--A PRIMER: 2. PREVENTION AND CONTROL. (Eng.) Bryan, J. A.; Pattison, C. P. (Center Disease Control, Atlanta, GA 30333). *Postgrad. Med.* 59(1):79-84; 1976.

1526 THE DIAGNOSIS AND PATHOGENESIS OF CLINICAL VARIANTS IN VIRAL HEPATITIS. (Eng.) Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Am. J. Clin. Pathol.* 65(5):898-908; 1976.

1527 SYSTEMATIC STUDY OF HEMOSTASIS IN VIRAL ACUTE HEPATITIS. (Por.) Chamone, D. A. F.; da Cunha, A. C. F.; de Oliveira e Silva, A.; Sette, H., Jr.; Pontes, J. F.; Raia, S.; da Silva, L. C. (Instituto de Medicina Tropical de Sao Paulo e Unidade de Figado, Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(4):233-237; 1975.

1528 BLOOD COAGULATION IN PATIENTS WITH ACUTE INFECTIOUS HEPATITIS IN INDIA. (Eng.) Dube, B.; Gupta, J. P.; Singh, D. S.; Sinha, V. N.; Bhattacharya, S.; Dube, R. (Medical Enclave, Banaras Hindu Univ., Varanasi, India). *Acta Haematol. (Basel)* 55(1):21-27; 1976.

1529 VIRAL HEPATITIS IN UNITED STATES SOLDIERS STATIONED IN KOREA, 1967-1970: PROPHYLACTIC EFFICACY OF GAMMA GLOBULIN. (Eng.) Smetana, H. F.; Smetana, F. G. (Tulane Univ. Sch. Medicine, New Orleans, LA). *Bull. N.Y. Acad. Med.* 52(5):536-560; 1976.

1530 THE A, B, C VIRUSES. (Eng.) Zuckerman, A. J. (No affiliation given). *Nature* 259 (5542):363-364; 1976.

1531 EARLY DECREASE IN THE SEMI-EPURATION PERIOD OF INDOCYANINE GREEN MEASURED BY TRANSCUTANEOUS ILLUMINATION IN CIRRHOSIS AND CHRONIC ALCOHOLISM. (Fre.) Lamy, J.; Aron, E.; Weill, J. (CHU de Tours, 2 bis Bd. Tonnelle, 37033 Tours Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(1):33-37; 1976.

1532 COMPARATIVE SENSITIVITIES OF RADIOIMMUNOASSAY, CROSSOVERELECTROPHORESIS, AND AGAR GEL IMMUNODIFFUSION FOR HBAg DETECTION. (Eng.) Hicks, E. J.; Hughes, B. J. (Indiana Univ. Sch. Medicine, 1100 West Michigan St., Indianapolis, IN 46202). *Am. J. Clin. Pathol.* 65(4):540-546; 1976.

1533 HEPATITIS B-ANTIGEN SUBTYPES IN AUSTRALIA AS DETECTED BY RADIOIMMUNOASSAY. (Eng.) Ng, P. L.; Powell, L. W.; Halliday, J. W.; Gera, K. L.; McKeering, L.; Campbell, C. B. (Royal Brisbane Hosp., Brisbane 4029, Australia). *Am. J. Gastroenterol.* 65(2):127-133; 1976.

1534 ANALYSIS AND COMPARISON OF TWO METHODS TO DETECT HEPATITIS B ANTIGEN: COUNTERELECTROPHORESIS (CEP) AND REVERSED PASSIVE LATEX-AGGLUTINATION (RPLA) TECHNIC IN RELATIONSHIP TO RADIOIMMUNOASSAY. (Eng.) Carvajal, C.; Di Bella, J.; Stincer, M. (Mt. Sinai Medical Center, 4300 Alton Rd., Miami Beach, FL 33140). *Am. J. Clin. Pathol.* 65(4):547-549; 1976.

1535 DETECTION OF HEPATITIS B SURFACE ANTIGEN IN PATIENTS WITH ACUTE VIRAL HEPATITIS. (Eng.) Lehmann, N. I.; Gust, I. D. (Fairfield Hosp. Communicable Diseases, Yarra Bend Rd., Fairfield, Victoria 3078, Australia). *Aust. N.Z. J. Med.* 6(1): 7-9; 1976.

1536 STATISTICAL EVALUATION OF THE HBAg IN THE COURSE OF VIRAL HEPATITIS. (Ita.) Franco, E.; Schiano, G.; Giovagnoli, P. (Clinica Malattie Infettive dell'Universita di Roma, Rome, Italy). *G. Mal. Infett. Parassit.* 27(7):465-467; 1975.

1537 HEPATITIS B VACCINES: RECENT ADVANCES AND PROSPECTS. (Ita.) Piazza, M.; Picciotto, L. (Clinica delle Malattie Infettive dell'Universita degli Studi de Napoli, Naples, Italy). *G. Mal. Infett. Parassit.* 27(9):815-821; 1975.

1538 NATURALLY OCCURRING ANTIBODY AGAINST UNUSUALLY HIGH SERUM DNA POLYMERASE ACTIVITY. (Eng.) Bradley, D. W.; Murphy, B. L.; Smith, J. L.; Maynard, J. E.; Gitnick, G. L. (Center Disease Control, 4402 N. 7th St., Phoenix, AZ 85014). *Nature* 259(5544):594-596; 1976.

1539 VIRUS-LIKE PARTICLES IN HBsAg-POSITIVE-CHRONIC AGGRESSIVE HEPATITIS AND LIVER CIRRHOSIS [Letter to Editor]. (Eng.) Yamada, G.; Tobe, K.; Kobayashi, T.; Ohta, Y.; Kosaka, K. (Okayama Univ. Medical Sch., Okayama, Japan). *Gastroenterology* 70(1):149-151; 1976.

1540 EVIDENCE FOR THE MULTIPLICATION OF HEPATITIS B VIRUS IN "OVAL CELL" CULTURE ORIGINATED FROM HUMAN EMBRYONIC LIVER. (Eng.) Watanabe, M.; Umenai, T.; Ohori, H.; Ishida, N. (Tohoku Univ. Sch. Medicine, 2-1 Seiryo-machi, Sendai, 980, Japan). *Br. J. Exp. Pathol.* 57(2):211-216; 1976.

1541 DIFFERENT TYPES OF GROUND GLASS HEPATOCYTES IN HUMAN LIVER BIOPSIES: MORPHOLOGY, OCCURRENCE AND DIAGNOSTIC SIGNIFICANCE. (Eng.) Thomsen, P.; Poulsen, H.; Petersen, P. (Inst. Pathological Anatomy, Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(2):113-119; 1976.

See also, 1176, 1208, 1239, 1458.

LIVER AND BILIARY TRACT

Chronic Hepatitis

1542 PERIPHERAL BLOOD LYMPHOCYTE POPULATIONS IN CHRONIC LIVER DISEASE. (Eng.) Thomas, H. C.; Freni, M.; Sanchez-Tapias, J.; De Villiers, D.; Jain, S.; Sherlock, S. (Dept. Medicine, Royal Free Hosp., Pond St., Hampstead, London, N.W.3, England). *Clin. Exp. Immunol.* 26(2):222-227; 1976.

Peripheral blood lymphocyte (PBL) concentrations were compared in 16 patients with alcohol-induced liver disease (ALD), 20 patients with primary biliary cirrhosis (PBC), and 23 patients with chronic active hepatitis (CAH) and cirrhosis to determine whether there are any changes peculiar to each disease.

Control data were obtained for 20 healthy subjects. The percentage and concentration of PBL that forms erythrocyte (E) rosettes were significantly decreased ($p<0.05$) in all patient groups compared to controls, but early-antigen (EA) rosette formation was not different from controls. Mature T-lymphocyte concentrations were reduced and Fc receptor-bearing (B and K) lymphocyte concentrations were normal in the patients. Null cells were significantly increased ($p<0.05$) in all patient groups. Treatment of patient lymphocytes with 0.1 ml levamisole (0.24 µg/ml) or thymosin (200 µg/ml) stimulated some null cells to form E-rosettes. In a hepatitis B surface antigen-negative CAH patient, 20 mg prednisolone/day had a beneficial effect, in that it decreased Fc receptor-bearing lymphocyte and null cell concentrations. Changes in PBL concentration were similar in all patient groups and, therefore, are probably secondary effects of liver damage.

1543 THERAPEUTIC AND PROGNOSTIC PROBLEMS OF PROTRACTED HEPATITIS. (Pol.) Kozakiewicz, H.; Stolarczyk, J.; Zielinska, W.; Ellert-Zygadlowska, J.; Jasiel, M.; Imielinska, H. (Klinika Chorob Zakaznych Instytutu Chorob Wewnetrznych AMG, 80-214 Gdansk, ul. Smoluchowskiego 18, Poland). *Pol. Tyg. Lek.* 30(22):949-951; 1975.

The treatment of persistent hepatitis, and its long-term results are discussed. Ninety patients with protracted viral hepatitis were observed for 1-4 yr. After follow-up, a puncture biopsy was performed to ascertain the morphological status of the liver. The patients received a rest cure, "liver" diet, and supportive medication, depending on their condition. Adrenal cortex hormones were administered to 74 patients during the acute stage of the disease, whose symptoms were continuous or remittent jaundice, stubborn dyspeptic disorders, pain in the joints, and discomfort. Prednisone (30-60 mg/day) was given for 3 months in 45 patients, up to 6 months in 10 patients, up to 12 months in 11 patients, and more than 12 months in 8 patients. At the end of the observation period, 58 patients were without complaints; 15 mentioned considerable weakness as a result of physical or mental efforts, dyspeptic symptoms, and intermittent liver and joint aches; and 5 patients were lost to follow up. Palpation showed continued liver enlargement in 47 patients; size and consistency of the organ were normal in the rest. In 30% of the patients, individual deviations from standard liver function tests were seen. Of 38 patients (36.6%) with control biopsies, 6 showed no liver pathology at all, 10 revealed slight regressive changes, and 7 showed persistent and 8, chronic hepatitis. Corticosteroid therapy produced an inhibitory effect on immunological processes and impaired formation of resistance, thus contributing to the duration of the disease. A careful and critical selection of patients for this kind of treatment is indispensable.

1544 ROLE OF CHRONIC HEPATITIS IN DEVELOPMENT OF THALASSAEMIC LIVER DISEASE. (Eng.) Masera, G.; Jean, G.; Gazzola, G.; Novakova, M. (Clinica Pediatrica dell'Universita degli Studi, Via Commenda 9, Milan, Italy). *Arch. Dis. Child.* 51(9):680-685; 1976.

Liver function was studied over a 4-yr period in 90 thalassemic children who were transfused with packed RBC every 20-30 days to maintain a hemoglobin (Hb) level of >7.5-8 g/dl. SGOT and SGPT levels were increased more than three times normal values in 62/90 children, and in 45 of these, raised levels persisted from 9 to 24 months. Nine children were hepatitis B surface antigen (HBsAg)-positive, 2 for 34 and 36 months, resp.; 28 children were anti-HBsAg-positive, 13 for prolonged periods, and 15 for only a few weeks. Liver biopsy of 26 of the patients with prolonged abnormally high transaminase levels revealed chronic persistent hepatitis (CPH) in 14, chronic aggressive hepatitis (CAH) in 9, and hepatic fibrosis in 3. The presence of HBsAg or anti-HBsAg was found in 9/14 CPH patients and in 8/9 CAH patients. Smooth muscle antibodies, rheumatoid factor, and migration inhibition factor were seen in most CAH patients. In all 26 biopsied children, massive siderotic pigmentation involving the hepatocytes, Kupffer cells, and macrophages of the portal spaces and fibrous tissue was noted. These findings support the hypothesis that chronic hepatitis contributes to the development of liver disease in a large number of thalassemic children undergoing transfusion therapy. The various forms of chronic hepatitis had special features that were probably due to the excessive iron overload.

1545 EFFECT OF TREATMENT ON THE COURSE AND OUTCOME OF CHRONIC HEPATITIS IN CHILDREN. (Rus.) Ebels, I. G.; Kartashova, O. I.; Saldava, L. A. (Riga Medical Inst., Stage Pediatric Hosp., Riga, USSR). *Pediatriia* (3):66-69; 1976.

1546 ACUTE "PAINFUL" HEPATITIS: CLINICAL PROBLEMS AND DIFFERENTIAL DIAGNOSIS. (Ita.) Ciammaichella, A.; Solitro, A.; Arcuri, P. (Ospedaliero Generale Regionale, Pio Istituto di S. Spirito ed O.O.R.R. di Roma, Rome, Italy). *G. Mal. Infett. Parassit.* 27(7):445-450; 1975.

See also, 1488, 1489, 1514, 1517, 1526, 1541, 1569.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

1547 HEPATIC VENOGRAPHY AND HEMODYNAMICS IN PATIENTS WITH ALCOHOLIC HEPATITIS. (Eng.) Miller, F. J., Jr.; Maddrey, W. C.; Sheff, R. N.; Harrington, D. P.; White, R. I., Jr. (Johns Hopkins Medical Institutions, Baltimore, MD 21205). *Radiology* 115(2):313-317; 1975.

1548 COMPARISON OF FEATURES OF ALCOHOLIC LIVER DISEASE IN U.S.A. AND IRELAND [Abstract]. (Eng.) Connell, A. M.; Weir, D.; Ball, C.; Foster, B.; Kennedy, M.; Fitzgerald, O.; McCarthy, C.; *et al.* (Univ. Cincinnati Medical Center, Cincinnati, OH). *Clin. Res.* 25(3):309A; 1977.

1549 HEPATIC RENIN AND ALDOSTERONE EXTRACTION IN ALCOHOLIC HEPATIC DISEASE: EFFECT OF PREDNISOLONE THERAPY [Abstract]. (Eng.) Mitch, W.; Whelton, P. K.; Cooke, C. R.; Walker, W. G.; Maddrey, W. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Clin. Res.* 25(3):315A; 1977.

1550 THYMOSIN EFFECT IN ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Mutchnick, M. G.; White, D. S.; Goldstein, A. L. (Dept. Medicine, Univ. Michigan, Ann Arbor, MI). *Clin. Res.* 25(3): 315A; 1977.

See also, 1385, 1477, 1493.

LIVER AND BILIARY TRACT

Cirrhosis

1551 FUNCTIONAL STUDY OF THE GASTRIC MUCOSAL BARRIER IN HEPATIC CIRRHOSIS. (Eng.) Solis-Herruzo, J. A.; Pardo-Rueda, J. (Ciudad Sanitaria de la Seguridad Social "1 de Octubre," Departamento de la Medicina Interna, Servicio de Digestivo, Carretera de Andalucia K 4.500, Madrid, Spain). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):351-359; 1976.

The penetration of H^+ through the gastric mucosal barrier was evaluated in 11 patients with hepatic cirrhosis and in 5 normal controls. The fluxes of Na^+, K^+, and Cl^- were also calculated. The mean H^+ flux was -0.42 mEq/15 min for the controls and -3.37 mEq/15 min ($p<0.05$) for the cirrhotics. In two patients, the H^+ back-diffusion was <2 mEq/15 min; in three, it was between 2 and 3 mEq/15 min; and in six, it was >3 mEq/15 min. The mean Cl^- flux was -0.18 mEq/15 min for the controls and -3.74 mEq/15 min ($p<0.05$) for the cirrhotics. In six cirrhotics, Cl^- back-diffusion was greater than the upper limits of normal, reaching a value of -12.73 mEq/15 min in one patient. The mean Na^+ flux was +3.86 and +1.96 mEq/15 min ($p<0.01$) for controls and patients, resp. In the patients, this positive Na^+ flux into the lumen was not parallel to H^+ loss. The mean K^+ flux was +0.26 mEq/15 min for the controls and +0.067 mEq/15 min ($p<0.01$) for the cirrhotics. Subsequent gastric biopsy showed dilatation of the capillaries and edema of the lamina propria in all of the patients. In five patients, there was also extravasation of the RBC; in three, the epithelial cells were desquamated; and in three, atrophic gastritis was present. One patient had melena, due to hemorrhagic gastritis. The cause of the damaged gastric mucosal barrier in the cirrhotics could be due to one or a combination of malnutrition, hypoproteinemia, hypoxia, portal hypertension, or reflux of the biliary salts.

1552 PREOPERATIVE LIVER FUNCTION TESTS CORRELATED WITH ENCEPHALOPATHY AFTER PORTACAVAL ANASTOMOSIS. (Eng.) Kardel, T.; Ramsoe, K.; Rasmussen, S. N. (Osterbrogade 54A, DK-2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(1): 29-32; 1975.

The correlation between preoperative galactose elimination capacity and the incidence and degree of encephalopathy after portacaval anastomosis was investigated. Changes in various liver function parameters were also studied. Portacaval shunt was used to treat 31 patients with liver cirrhosis and bleeding esophageal varices. Of these, 18 had alcoholic cirrhosis, 11 had cryptogenic cirrhosis, and 2 had primary biliary cirrhosis. A side-to-side shunt was performed in 12 and an end-to-side, in 19. The galactose elimination capacity, serum bilirubin and albumin concentrations, and prothrombin time were measured from 2 weeks to 15 months following surgery. The patients were classified into three groups according to the degree of postoperative encephalopathy: poor (severe encephalopathy requiring nursing care); fair (patients without severe encephalopathy); and good (patients with no portasystemic encephalopathy). Six patients died: four from postoperative bleeding, one from cardiac arrest, and one from variceal hemorrhage following thrombosis of the anastomosis. There was a significant deterioration in galactose elimination (median, -26 mg/min), serum bilirubin (median, +0.4 mg/100 ml), and prothrombin time (median, -10%) following shunt. Serum albumin was unchanged. The decrease in galactose elimination correlated significantly with the preoperative value ($p<0.05$). None of the liver function tests discriminated between fatal cases and survivors. The postoperative course was evaluated as poor in 6 cases, fair in 8, and good in 11. The postoperative clinical results correlated significantly with the preoperative galactose elimination and with age at operation ($p<0.001$). Of seven patients with a preoperative value ≤225 mg/min, the postoperative rating was poor in four, fair in two and good in one; five of six patients considered poor were aged over 60 yr. The prognosis was significantly worse in cryptogenic than in alcoholic cirrhosis ($p=0.05$). It is suggested that the poorer results of shunt surgery in the aged may be related to a progressive deterioration of liver function with age.

1553 LIVER VOLUME ESTIMATED BY ULTRASONIC SCANNING BEFORE AND AFTER PORTAL DECOMPRESSION SURGERY.

(Eng.) Rasmussen, S. N.; Kardel, T.; Jorgensen, B. J. (Gentofte Hosp., DK-2900 Hellerup, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(1):25-28; 1975.

The results of liver volume determination by ultrasonic scanning in 12 cirrhotic patients before and after portal decompression surgery are presented. These data are also compared with studies of liver function measured by the galactose elimination capacity. Six patients had alcoholic cirrhosis and six had cryptogenic cirrhosis. Shunt procedures included end-to-side (7 patients), side-to-side (4), and portarenal (1). The preoperative liver volume in alcoholic cirrhosis ranged from 1,695 to 3,483 ml (median, 2,541 ml), and in cryptogenic cirrohsis, from 1,048 to 2,358 ml (median, 1,446 ml). This difference was significant ($p< 0.05$). Liver volume decreased significantly following surgery ($p<0.01$) with a median decrease of 402 ml, or 2% of the preoperative median volume. No significant change in galactose elimination was found. Liver volume and galactose elimination were not correlated preoperatively, but became so after surgery ($p<0.05$). The postoperative liver volume was also correlated with the preoperative galactose elimination ($p<0.01$). The specific galactose elimination showed a median increase of 5 mg/min x 100 ml liver volume ($p<0.05$). It is suggested that after decompression surgery, the liver adapts the volume according to the functional capacity of the parenchyma. The postoperative decrease in liver volume seems to be due to loss of superfluous blood, water, and fat from liver tissue.

1554 FREE AMINO ACIDS IN THE PLASMA AND URINE OF LIVER CIRRHOSIS PATIENTS.

(Cro.) Rosic, D.; Pokrajcic, G.; Obradovic, M.; Rosic, J. (Univ. Hosp., Belgrade, Yugoslavia). *Acta Med. Iugosl.* 29(3):265-270; 1975.

A qualitative and quantitative analysis of free amino acids in the blood plasma (in mg%) and urine (in mg/24 hr) of 10 healthy subjects and 20 decompensated liver cirrhosis patients was conducted by chromatography. In healthy subjects, 23 amino acids were found in the plasma and 25 in the urine, while in liver cirrhosis patients, these figures were 22 and 26, resp. Tryptophan (1.11 mg%) was found in the plasma of normal adults, but not in that of cirrhosis patients. Proline (1.62 mg/24 hr) was present in the urine of cirrhosis patients, but not in that of control subjects. Marked quantitative differences between the concentrations of many amino acids in healthy subjects and those in cirrhotic patients were also noted. Reduced plasma and urine levels of glutamine and methionine and reduced plasma levels of cysteine in patients with cirrhosis suggest that these amino acids may be used in cirrhosis therapy.

1555 DEOXYCHOLIC ACID IN THE THERAPY OF LIVER CIRRHOSIS.

(Cze.) Fassati, P.; Chyle, P.; Fassati, M.; Chyle, M. (Oddeľeni klinicke biochemie, OUNZ, Sokolovska 304, 19061 Prague 9, Czechoslovakia). *Cas. Lek. Cesk.* 114(40):1222-1226; 1975.

Deoxycholic acid (ADOCH) was given *ad nebulas* (0.15 g, b.i.d., for 3 months) to 17 men and 11 women with liver cirrhosis with moderately severe and severe functional disturbances. Treatment was continued for another 3 months in two patients and for up to a year in three patients. A series of over 20 biochemical tests on the blood serum and urine was conducted 6 months before treatment, immediately before treatment, 1 month after the onset of treatment, and at the end of the 3-month treatment period. Statistically significant improvement was observed in 11 of the 19 blood serum tests, with the most noticeable improvement manifested in the BSP curve ($p<0.001$), BSP 45-min retention test ($p<0.001$), albumin turbidity reaction ($p<0.001$), thymol turbidity reaction ($p<0.001$), and GPT ($p<0.001$) and GOT ($p<0.001$) activities. Improvements in other tests were either of low statistical significance or unproven. The subjective condition of most patients also improved. In patients treated longer than 3 months, laboratory tests did not show further significant improvement, but no unfavorable effects were observed. Thus ADOCH had a favorable effect in liver cirrhosis patients, with test results indicating an improvement in protein synthesis, primarily in the albumin fraction. The exact nature of the mechanism of the effect of ADOCH in liver cirrhosis patients is not known.

1556 GASTROINTESTINAL EDEMA IN CIRRHOTICS: RADIOGRAPHIC MANIFESTATIONS AND PATHOGENESIS WITH EMPHASIS ON COLONIC INVOLVEMENT. (Eng.) Balthazar, E. J.; Gade, M. F. (New York Medical Coll.-Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10029). *Gastrointest. Radiol.* 1(3): 215-223; 1976.

Radiologic manifestations of gastrointestinal edema in 22 consecutive patients with advanced liver cirrhosis are described. All patients were chronic alcoholics, and all had portal hypertension, as demonstrated by the presence of varices. In terms of gastric involvement, large gastric folds were occasionally seen in association with typical small bowel changes; involvement was diffuse, with large tortuous rugae being observed in the entire stomach. An irregular contour along the entire circumference of the barium-filled stomach was seen; and the normal, deep, symmetrical peristaltic waves were diminished or absent. Small bowel involvement included irregular thickened mucosal folds and mild dilatation in the duodenum and proximal jejunum; superficial and disorganized peristaltic contractions; free peritoneal fluid; and uncoiling, separation, or centralization of intestinal loops. Reduced distensibility and an irregular contour with an asymmetrical and deformed haustral pattern was observed in a barium-filled colon. Occasionally, a smooth configuration devoid of haustra was seen. The expected shortening of the colon in a postevacuation film did not occur, and visualized mucosal folds showed marked thickening and a distorted pattern that may mimic diffuse nodularity. A significant number of cases (13) showed involvement of the descending colon and the rectosigmoid segment. Involvement of the right side of the colon was a constant feature. These studies suggest that the production of intestinal edema is the result of a complex mechanism involving multiple factors on both sides of the capillary membrane, such as the ability of the lymphatic system to handle excessive flow, the oncotic pressure, the hydrostatic pressure, and portal hypertension with or without venous collaterals. Portal hypertension seems to play a dominant role, since it correlates best with intestinal edema and explains its usual distribution.

1557 BILIARY CIRRHOSIS: AN APPRAISAL. THE CROONIAN LECTURE 1975. (Eng.) Mann, W. N. (Guy's Hosp., London, England). *J. R. Coll. Physicians (Lond.)* 10(2):117-132; 1976.

1558 PRIMARY BILIARY CIRRHOSIS. (Eng.) Heiss, F. W. (No affiliation given). *Lahey Clin. Found. Bull.* 25(2):74-78; 1976.

1559 ASYMPTOMATIC PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Long, R. G.; Scheuer, P. J.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 17(5):390; 1976.

1560 CIRRHOSIS IN AFRICAN CHILDREN AT DAKAR. (Fre.) Sanokho, A.; Kuakuvi, N.; Kessie, F.; Zohoun, I.; N'Diaye, P. D.; Bayo, S. (No affiliation given). *Bull. Soc. Med. Afr. Noire Land. Fr.* 20(2):20-25; 1975.

1561 ASCITES VOLUME MEASURED WITH INDOCYANINE GREEN: COMPARISON WITH RADIOIODINATED SERUM ALBUMIN [Abstract]. (Eng.) Houk, J. H.; Stanley, M. M. (Veterans Admin. Hosp., Hines, IL). *Clin. Res.* 25(3):312A; 1977.

1562 LYMPHATIC ABSORPTION OF ASCITIC FLUID IN ALCOHOLIC CIRRHOSIS [Abstract]. (Eng.) Houk, J. H.; Stanley, M. M. (Veterans Admin. Hosp., Hines, IL). *Clin. Res.* 25(3):467A; 1977.

1563 TROPICAL CIRRHOSIS AND HEPATOMA. (Eng.) Coady, A. (Medical Res. Council Lab., Fajara, Gambia). *J. R. Coll. Physicians (Lond.)* 10(2):133-144; 1976.

1564 DIFFERENT PLASMA AMINO ACID PATTERNS IN HEPATIC ENCEPHALOPATHY IN FULMINANT HEPATITIS AND LAENNEC'S CIRRHOSIS. THERAPEUTIC IMPLICATIONS [Abstract]. (Eng.) Fischer, J. E.; Rosen, H.; Ebeid, A. M.; James, J. H.; Keane, J.; Soeters, P. B.; *et al.* (Massachusetts General Hosp., Boston, MA). *Clin. Res.* 24(3):432A; 1976.

1565 MASSIVE HEMORRHAGE FROM ILEOSTOMY AND COLOSTOMY STOMAS DUE TO MUCOCUTANEOUS VARICES IN PATIENTS WITH COEXISTING CIRRHOSIS. (Eng.) Graeber, G. M.; Ratner, M. H.; Ackerman, N. B. (State Univ. New York, Upstate Medical Center, Syracuse, NY 13210). *Surgery* 79(1): 107-110; 1976.

1566 LIFE-THREATENING HEMORRHAGE OF THE DIGESTIVE TRACT IN CIRRHOTIC PATIENTS. AN ASSESSMENT OF THE POSTOPERATIVE MORTALITY AFTER EMERGENCY PORTACAVAL SHUNT. (Eng.) Prandi, D.; Rueff, B.; Roche-Sicot, J.; Sicot, C.; Maillard, J. N.; Benhamou, J. P.; Fauvert, R. (Hopital Emile Roux, 95 Eaubonne, France). *Am. J. Surg.* 131(2):204-209; 1976.

1567 URINARY AFLATOXIN DETECTED IN CIRRHOTIC PATIENTS IN ISFAHAN, IRAN. (Eng.) Maleki, M. F.; Suzangar, M.; Jamshidi, C.; Tahmasebi, A.; Barnett, R. (Regional Mycotoxin Center, Univ. Isfahan, Iran). *Clin. Res.* 24(5):630A; 1976.

1568 CEREBRAL AMMONIA METABOLISM IN LIVER DISEASE IN MAN [Abstract]. (Eng.) Lockwood, A. H.; McDonald, J. M.; Gelbard, A. S.; Reiman, R. E.; Duffy, T. E.; Laughlin, J. S.; Plum, F. (Cornell Univ. Medical Coll., New York, NY). *Clin. Res.* 24(3):433A; 1976.

59 DEFECTIVE T-LYMPHOCYTE-SPECIFIC CYTOTOXI-
CITY IN PRIMARY BILIARY CIRRHOSIS (PBC)
T NOT IN CHRONIC HEPATITIS (CH) [Abstract].
ng.) Vierling, J. M.; Nelson, D. L.; Strober, W.;
ndy, B. M.; Jones, E. A. (Natl. Inst. Arthritis,
tabolism, and Digestive Diseases, Natl. Inst.
alth, Bethesda, MD 20014). *Clin. Res.* 24(3):
3A; 1976.

70 VARIABILITY OF HEPATIC MICROSOMAL RESPONSE
TO LIVER DISEASE AND DIPHENYLHYDANTOIN
ostract]. (Eng.) Hepner, G. W.; Vesell, E. S.
(Dept. Medicine, Pennsylvania State Univ., Hershey, PA). *Clin. Res.* 24(3):423A; 1976.

See also, 1183, 1213, 1250, 1477, 1479, 1488, 1489, 1494, 1539, 1541, 1542, 1547, 1572.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

71 THE EVALUATION AND APPLICATION OF ANGIO-
GRAPHY IN DIAGNOSIS OF GALLBLADDER
SEASES. (Jpn.) Kusano, S.; Matsubayashi, T.,
a, S.; Itoh, K.; Horiike, S.; Hiramatsu, K.;
tsuyama, S.; Kitsuki, T. (Kitasato Univ., Sch.
dicine, Asamizodai, Sagamihara, Kanagawa, Japan).
ppon Acta Radiol. 35(12):1069-1081; 1975.

giography was performed on 19 patients with
llbladder cancer, and the angiographic findings
re compared with the histologic and clinical
ndings, to formulate diagnostic standards.
lignancy could be definitely diagnosed upon the
esence of encasement (inside diameter more than
mm) in the cystic artery and arteries adjacent
the gallbladder, and amputation in the branches
the cystic artery. However, abnormal angio-
aphic findings, such as mottled staining and
ovascularity, were found in malignant and
nign gallbladder inflammations. Angiography is
propriate upon nonopacification of the gallbladder
th oral or drip infusion cholecystography, when
lignancy is suspected clinically, or there
need for a preoperative examination.

72 ENDOSCOPIC RETROGRADE INTRAHEPATIC CHO-
LANGIOGRAM: RADIOGRAPHIC FINDINGS IN
TRAHEPATIC DISEASE. (Eng.) Rohrmann, C. A., Jr.;
sel, H. J.; Ayoola, E. A.; Silvis, S. E.; Vennes,
A. (Univ. Washington Sch. Medicine, Seattle, WA
95). *Am. J. Roentgenol.* 128(1):45-52; 1977.

contributions of endoscopic retrograde cho-
giopancreatography (ERC) in diagnosing processes
volving the intrahepatic biliary tree were eval-
ted in 107 patients, and the results were corre-
ted with intrahepatic diagnoses by liver biopsy.
histologic diagnoses were: normal, 6; hepatitis,
cirrhosis, 38; cholestasis, 4; portal fibrosis,
fatty metamorphosis, 3; cholangitis, 22; neoplasia, 13; congenital hepatic fibrosis, 1; and polycystic liver disease, 1. For the normal patients, the ductal characteristics correlated well with those found at biopsy. For the cirrhotics, the cholangiograms showed multiple focal stenoses in 22 patients, decreased arborization in 25, and, to a lesser extent, tortuosity and approximation of the intrahepatic ducts. All five patients with sclerosing cholangitis had abnormal cholangiograms, with focal stenoses in five, focal ectasias in five, and nonobstructing extrahepatic biliary stenoses in two. Chronic cholangitis and portal fibrosis were frequently associated with extrahepatic obstructing lesions and increased intrahepatic ductal caliber, but no distinguishing intrahepatic characteristics. The neoplasias and the case of polycystic liver disease showed mass effects comprising ductal displacement, narrowing, and encasement. The potential of ERC is significant, especially in separating normal from abnormal cases, in distinguishing between intrahepatic processes, and as an adjunct to liver biopsy.

1573 5 YEARS EXPERIENCE IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY (ERCP). (Eng.) Belohlavek, D.; Koch, H.; Rosch, W.; Schaffner, O.; Maeder, H. U.; Flory, J.; *et al.* (Medizinische Univ.-Klinik, Krankenhausstr. 12, 8520 Erlangen, W. Germany). *Endoscopy* 8(3):115-118; 1976.

Five years' experience with endoscopic retrograde cholangiopancreaticography (ERCP) is reported, comprising 2,507 investigations in 1,981 patients. The cannulation of at least one ductal system was possible in 93% of the examinations. Pancreatography was successful in 82%, while cholangiography was successful in 63%. Normal anatomy was seen in 51.5% of the investigations. Pathological alterations of the pancreas included irregularities of the ductal system, strictures, pseudocysts, and calculi. Chronic pancreatitis was diagnosed based on these criteria in 405 patients; pancreas carcinoma was diagnosed in 76 patients. The most common pathological findings of the biliary tree were concretions in 168 patients. ERCP proved helpful in the diagnosis of chronic pancreatitis and became mandatory as a preoperative indication of resection. Disorders of the biliary duct can easily be diagnosed by ERCP, especially in the case of obstructive jaundice.

1574 ULTRASONIC VISUALIZATION OF THE NON-OPACIFIED GALLBLADDER: RESPONSE OF THE NORMAL AND OBSTRUCTED CANINE GALLBLADDER TO C8CCK.

(Eng.) Lindstrom, R.; Herman, M. W.; Tabrisky, J.; Castagna, J. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Invest. Radiol.* 11(5): 464-471; 1976.

In vivo studies in normal dog gallbladders and *in vitro* studies with a simulated gallbladder were carried out to determine whether B-scan ultrasonography is as reliable as radiography in measuring changes in volume of the organ. The width or planimetric area of the sonogram correlated with the change in balloon volume and with similar radiographic measurements. *In vivo* measurements of the normal canine gallbladder stimulated by a carefully prescribed infusion of the C-terminal octapeptide of cholecystokinin (2.2-5.5 ng/kg/min for 8-10 min) showed a clearly defined decrease in gallbladder width. In ligation and division of the common bile duct, no change in gallbladder size was demonstrated. It is concluded that sonography alone can be used to measure a change in gallbladder size to better differentiate complete obstruction of the common bile duct from medical causes in the jaundiced patient.

1575 SIGNIFICANCE OF ENZYMATIC CHANGES IN THE SERUM IN DISEASES OF THE BILE DUCTS.

(Cze.) Ninger, E. (Onkologicky ustav, Bayerova 40, 602 00 Brno, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(8):547-553; 1975.

A review of literature indicates that in acute flare-ups and complications of gallbladder and biliary tract diseases, enzyme changes in the serum involving both excretory and indicator enzymes of the liver are relatively frequent. The cause of these changes is primarily cholestasis, and they are more frequent and more marked in a clinical course with jaundice. The activity levels of individual hepatic enzymes in the serum differ, depending on the sensitivity of their response to cholestasis. Knowledge of these enzyme changes, although they are not absolutely specific for biliary tract diseases, can supplement the clinical picture in difficult cases. In chronic biliary tract diseases in the asymptomatic phase, the majority of the blood enzyme pictures are poorly or only slightly different from the normal, and cannot in themselves serve to differentiate chronic biliary tract disease from inactive chronic hepatopathies.

1576 INFLUENCE OF CHOLIC AND CHENODEOXYCHOLIC ACID ON CANALICULAR BILE FLOW IN MAN.

(Eng.) Lindblad, L.; Schersten, T. (Surgical Metabolic Research Lab., Sahlgrenska sjukhuset, Univ. Goteborg, S-413 45 Goteborg, Sweden). *Gastroenterology* 76(6):1121-1124; 1976.

Hepatic bile flow was measured, and hepatic [^{14}C]mannitol clearance was calculated, during depletion of the bile pool and during duodenal administration of cholic (1 g/hr) or chenodeoxycholic acid (1 g/hr) in 10 patients. The patients had undergone surgery for uncomplicated gallstone disease 7-12 days earlier. The biliary mannitol clearance correlated significantly with the bile flow. During depletion of the bile acid pool and during duodenal infusion of both cholic and chenodeoxycholic acid, the bile to plasma ratio of [^{14}C]mannitol was significantly less than unity (0.74 ± 0.01), indicating that the mannitol clearance was lower than bile flow. Linear relations between the bile acid secretion rate and bile flow and between the bile acid secretion rate and [^{14}C]mannitol clearance were found during depletion of the bile acid pool (secretion of cholic, chenodeoxycholic, and deoxycholic acids; relative concentration, 1.0:1.0:0.5 g), as well as during cholic acid infusion (73 ± 3% cholic acid in the secreted hepatic bile) and during chenodeoxycholic acid infusion (88 ± 2% chenodeoxycholic acid in the secreted hepatic bile). The bile flow dependence on bile acids (0.011 ± 0.002 ml/µmol) was not significantly different for mixed bile acid secretion or mainly cholic acid or chenodeoxycholic acid secretion. The ductular bile flow (0.08 ± 0.03 ml/min) was not significantly influenced by the various experimental conditions. The canalicular flow, the bile acid independent flow (0.17 ± 0.05 ml/min), and the bile acid dependent flow, constituted 70-85% of the total bile flow. It is concluded that secretion of cholic acid and of chenodeoxycholic acid promotes the same bile flow volume per µmol in man.

1577 CRITICAL SEQUELAE IN BILIARY TRACT DISEASE.

(Eng.) Glenn, F. (Cornell Univ. Medical Coll., New York, NY). *Am. Surg.* 42(10):735-743; 1976.

Critical sequelae in calculous biliary tract disease are reviewed. The more common of these are acute cholecystitis, choledocholithiasis, acute obstructive suppurative cholangitis, biliary enteric fistula, liver abscess, related pancreatitis, and biliary cirrhosis. Principle etiological factors that contribute to the pathological changes of acute cholecystitis, a sequela of gallstones, are obstruction, infection, and ischemia; obstruction in calculous disease is by far the most common initiating cause. Retention of calculi in the ductal system following cholecystectomy and/or common duct exploration with or without demonstrating choledocholithiasis is always a potential problem; and the older the patient, the greater the likelihood of choledocholithiasis in the presence of cholelithiasis. Obstruction and infection are common manifestations of biliary tract disease; when complete obstruction to bile flow occurs within the common duct or in one or more of the major intrahepatic ducts in the presence of pathogenic enteric bacteria, a catastrophic syndrome, characterized by sudden severe right upper quadrant abdominal pain, often develops. Biliary enteric fistulas are a complication of longstanding and far advanced biliary tract disease; in the majority of cases, there is perforation of the gallbladder with the discharge of a stone or stones into the lumen of an adherent viscus, usually the intestine. Intrahepatic pyogenic abscess usually follows recurrent cholangitis associated with calculous disease with obstruction. The diagnosis of pancreatitis associated with calculous biliary tract disease is confirmed by elevation of pancreatic enzymes (normal range; amylase, 40-140 and lipase, 0.2-2.0 ml of 0.10 sodium hydroxide/ml serum). The mortality rate (estimated 20%) is high in the severe acute forms of pancreatitis. Biliary cirrhosis is not infrequently seen in patients over 65 yr of age with a small contracted gallbladder containing stones and with stones in the common duct.

1578 ON THE MEDIATION OF INFLAMMATORY REACTION IN THE HUMAN GALLBLADDER EPITHELIUM.

(Eng.) Sjodahl, R.; Tagesson, C. (Dept. Surgery, Linkoping Univ., Linkoping, Sweden). *Scand. J. Gastroenterol.* 11(3):321-328; 1976.

The lysosomes of the human gallbladder epithelium were investigated to determine their relation to the subcellular localization of phospholipase activity. Homogenates of human gallbladder epithelium obtained at cholecystectomy were prepared, and the specific activities (activity/mg protein) of six different acid hydrolases were determined. The highest activities were noted for *N*-acetyl-β-glucosaminidase (9×10^{-2}) and acid phosphatase (3×10^{-2}), while only minor activities of β-galactosidase (7×10^{-7}) and β-xylosidase (7×10^{-7}) were recorded. Activities of β-glucuronidase (4×10^{-3}), β-glucosidase (2×10^{-4}), and β-fucosidase (1×10^{-4}) were in between. The phospholipase activity in the homogenized gallbladder epithelium was then 1.5 nmol lecithin hydrolyzed/min/mg protein. All the enzymes exhibited structure-linked latency. When the subcellular organelles were analytically separated by density gradient centrifugation at 100,000 *g* for 1 hr, particles containing acid glycosidases were recovered at a sucrose density of 1.18-1.19, while the mitochondrial marker enzyme succinate-reductase accumulated at a density of 1.16. The bulk of sedimentable phospholipase activity was recovered with particles sedimenting at 1.18-1.19. The results suggest that phospholipase is present in lysosomes of the human gallbladder epithelium.

1579 SEMIQUANTITATIVE MEASUREMENT OF LITHOCHOLIC ACID COMPOUNDS IN BILE FROM PATIENTS WITH GALLSTONES, BEFORE AND DURING TREATMENT WITH CHENODEOXYCHOLIC ACID.

(Eng.) Arnfred, T.; Pedersen, L. (Dept. Clinical Chemistry, Aalborg Sygehus, afsnit Nord, DK-9100 Aalborg, Denmark). *Scand. J. Gastroenterol.* 11(5):497-504; 1976.

A method for two-dimensional thin-layer chromatography of unprocessed bile is described. The method was used in the analysis of duodenal bile from 14 healthy subjects, 6 untreated patients with gallstones, and the same 6 patients after treatment with chenodeoxycholic acid. The method gives distinct spots from lithocholic acid and its compounds with glycine, taurine, and sulfuric acid. The size of the spots is estimated by comparison with standard spots, and the concentrations of individual bile acids are expressed as a fraction of the total content of bile acids in the sample. The concentration of total lithocholic acid was found to be 1-3% (mean 1.5%) of the total concentration of bile acids in duodenal bile from the healthy persons. It was slightly higher in bile from six untreated patients with gallstones, and still higher, 3-7% (mean 4.0%) in bile from the same patients during chenodeoxycholic acid treatment. The difference between the concentrations of total lithocholic acid in the bile samples from healthy persons and from patients treated with chenodeoxycholic acid was statistically significant ($p<0.01$). Nearly all the lithocholic acid was conjugated with glycine or taurine, and approximately half of it was sulfated. The increase in the total lithocholic acid concentration in the bile from patients consisted of glycine conjugates. Two-dimensional thin-layer chromatography may be useful for identifying toxic side-effects of chenodeoxycholic acid therapy for gallstones.

1580 HORMONAL THERAPY AND CHOLELITHIASIS.

(Eng.) Weiss, G. N.; Weiss, E. B. (1611 Foster St., Lake Charles, LA 70601). *Int. Surg.* 61(9):472-474; 1976.

A brief review correlating hormonal therapy with an increased incidence of cholelithiasis in younger women is presented. A study of 1,346 cholecystectomies indicated that the incidence of gallbladder surgery in women under 40 yr of age increased 7.4% between 1969 and 1973. Among women who had taken hormonal medication, the incidence of surgery was far greater in those under 30 yr of age than in those aged 30-39. Both incidences far exceeded those in groups of similar age that had not received hormonal therapy. Studies have shown that cholelithiasis is nearly always the result of mechanical obstruction, which in turn is due to alterations in the chemistry of the bile or disturbances in biliary function. During pregnancy, the gallbladder is affected by the general smooth muscle atony of the entire digestive system, resulting in slow emptying of the gallbladder. BSP excretion had been found to be decreased 27% in pregnant women, a result that could be duplicated in nonpregnant women by the administration of estrogens. In one study, it was estimated that the annual attack-rate of surgically proven gallbladder disease in otherwise healthy women is about 79/100,000 in those who do not use oral contraceptives, and about twice as high in those who do. It is concluded that hormonal medication is responsible for the increased incidence of cholecystectomies in the younger woman. The incidence of gallbladder disease in young women is expected to increase in the coming years.

1581 THE BETA-CHOLESTEROL IN CHOLESTASIS OF PREGNANCY. II. ENZYMATIC CHANGES IN BLOOD SERUM SAMPLES FROM WOMEN WITH CHOLESTASIS IN PREGNANCY VERSUS THE CHOLESTEROL CONCENTRATIONS IN BETA-LIPOPROTEIN FRACTIONS. (Pol.) Wankowicz, Z.; Roszkowski, I.; Wojcicka, J. (II. Klinika Poloznictwa i Ginekologii IPG AM, 00-315 Warsaw, ul. Karowa 2, Poland). *Ginekol. Pol.* 46(11):1147-1158; 1975.

A possible link between higher cholesterol concentrations in pre-beta and beta-lipoprotein fractions in the serum of pregnant women with cholestasis and extent of liver damage is reported. The level of alanine and asparagine aminotransferases (ALAT and ASPAT, resp.), alkaline phosphatase (total and thermostable), and ceruloplasmin concentrations in the blood were ascertained in 36 women with pregnancy-induced intrahepatic cholestasis. The women were divided into groups according to the level of activity of the enzymes indicated. In the group with an ASPAT activity of below 100 U, a beta-cholesterol concentration of 216 ± 51.6 mg% was noted; in the group with an ASPAT activity of 101-320 U, the beta-cholesterol concentration was 242 ± 40.9 mg%. The same results obtained when the patients were divided into high and low activity groups for ALAT. These values, as well as those for alkaline phosphatase and ceruloplasmin were not statistically significant. Thus, it could not be demonstrated that higher cholesterol concentrations in pre-beta and beta-lipoprotein fractions in women with pregnancy-induced cholestasis could be linked to the activity level of the enzymes mentioned.

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See also, 0912, 1052, 1180, 1185, 1203, 1211, 1216, 1248, 1376, 1457, 1486, 1487.

GENERAL

1644 DEGRADATION OF BLOOD GROUP ANTIGENS IN HUMAN COLON ECOSYSTEMS. II. A GENE INTERACTION IN MAN THAT AFFECTS THE FECAL POPULATION DENSITY OF CERTAIN ENTERIC BACTERIA. (Eng.) Hoskins, L. C.; Boulding, E. T. (Veterans Admin. Hosp., Cleveland, OH 44106). *J. Clin. Invest.* 57(1):74-82; 1976.

The population densities of fecal bacteria that produce A- and H-degrading activities were estimated in feces of 22 healthy subjects by determining the greatest dilution of feces that yielded A, B, or H blood group degrading enzyme activity after 24 hr incubation in anaerobic cultures. Comparatively small populations of fecal bacteria produced blood group degrading enzymes; their estimated populations were 2 x 10^{-8} g or less in 21 subjects. Fecal populations of B-degrading bacteria were stable over extended periods, and their population density averaged 50,000-fold greater in blood group B secretors than in other subjects. This was due, in part, to a competitive nutritional advantage gained by their ability to enzymatically cleave the B antigenic determinant α-D-galactose from gut mucins of B secretors. Estimated populations of bacteria producing B-degrading activity differed from those producing either A- or H-degrading activity by more than 100-fold in 11 subjects and by 100-fold in 3 subjects. This strongly suggests that B-degrading activity is produced by a different population of bacteria than A- or H-degrading activity. These findings suggest that adaptation of blood group degrading enzymes to mucin structures in human colon ecosystems is chiefly by mutation selection of comparatively small populations of constitutive enzyme producing strains, rather than by substrate-induced enzyme synthesis in many strains.

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Small intestinal biopsies from 16 children with celiac disease, 14 with acute gastroenteritis, 12 with failure to thrive, 9 with giardiasis, and 7 normal children were investigated to determine whether a high intraepithelial lymphocyte count is a feature specific to celiac disease or whether it is always associated with partial or subtotal villous atrophy. The normal range for children's intraepithelial lymphocyte counts was similar to that for adults (approximately 6-40 lymphocytes/100 epithelial cells). Lymphocyte counts were high in celiac disease, but were also high in some children with giardiasis or with failure to thrive in whom jejunal biopsy appeared otherwise normal. Intraepithelial lymphocyte counts were normal in acute gastroenteritis, even when there was partial villous atrophy with increased lamina propria lymphoid cell infiltrate. The measurement of small intestinal lymphocyte infiltration may be of diagnostic value in differentiating the diarrhea of food intolerance from infectious diarrhea in young children.

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See also, 1091, 1157, 1186, 1192, 1252, 1256, 1328, 1353, 1362, 1377, 1379, 1384, 1387, 1406, 1422, 1490, 1583.

GENERAL

Parasitology

1709 HEPATIC ARTERY HYPERTROPHY AND SINUSOIDAL HYPERTENSION IN ADVANCED SCHISTOSOMIASIS. (Eng.) Paes Alves, C. A.; Rabelo Alves, A.; Abreu, W. N.; Andrade, Z. A. (Rua Padre Feijo, 31 Anexo 1 Faculdade Medicina, 4000 Salvador, Bahia, Brazil). *Gastroenterology* 72(1):126-128; 1977.

To test the hypothesis that arterial hypertrophy causes the sinusoidal hypertension in advanced schistosomiasis, the wedged hepatic vein pressure was determined in five patients with hepatosplenic schistosomiasis and sinusoidal hypertension and in one control patient, before, during, and after clamping the main trunk of the hepatic artery. The wedged hepatic pressure in the five patients varied from 20.7 to 35.4 mm Hg. While the catheter was in an occluded position within the hepatic vein and the patients were undergoing splenectomy, the main trunk of the hepatic artery was clamped. The sinusoidal pressure then fell to levels that varied from 3.7 to 7.4 mm Hg, but returned to previous levels when the clamping was released. Wedged hepatic venous pressure levels, which were significantly greater than portal venous pressure values, decreased minimally after splenectomy. Portal venous pressure levels, however, fell to 63% of presplenectomy levels. In the control case with an enlarged spleen (cavernous hemangioma), but with a normal liver, the wedged hepatic pressure was 7.4 mm Hg and showed no alteration after clamping of the hepatic artery. These data point out the importance of hepatic artery hypertrophy in causing elevation of the wedged hepatic pressure in advanced hepatic schistosomiasis.

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1729 IMMUNIZING EFFICACY OF A KENYAN STRAIN OF Schistosoma mansoni IN RHESUS MONKEYS (Macaca mulatta). (Eng.) Damian, R. T.; Greene, N. D.; Meyer, K. F. (Dept. Zoology, Univ. Georgia, Athens, GA 30602). *Am. J. Trop. Med. Hyg.* 25(2): 355-357; 1976.

See also, 1252, 1472, 1645.

GENERAL

Regional Enteritis

1730 IMMUNOHISTOCHEMICAL CHARACTERIZATION OF LOCAL IMMUNOGLOBULIN FORMATION IN CROHN'S DISEASE OF THE ILEUM. (Eng.) Baklien, K.; Brandtzaeg, P. (Medical Dept. A., Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(5):447-457; 1976.

Paired direct immunofluorescence was used to localize and differentially enumerate immunocytes containing the various immunoglobulin (Ig) classes in ileal bowel walls of 10 patients with Crohn's disease and 7 control patients. In slightly inflamed mucosa, the total number of Ig-containing cells of an average "tissue unit" increased threefold, compared with normal controls, but only minor changes occurred in class ratios. In severely inflamed mucosa with persisting glands, the total immunocyte number was increased by a factor of 12.2, compared with the control unit. For IgA, IgM, and IgG cells, this increase was 9.0, 12.0, and 60.9, resp. The immunocyte ratios for these three major Ig classes were 57.5:14.7:27.7 in the inflamed mucosa and 83.1:11.4:5.4 in the histologically normal control mucosa. When severely inflamed specimens from the ileum and from the colon were compared, there was no statistically significant difference in absolute immunocyte counts or class distributions. IgD and IgE immunocytes were extremely rare, and no consistent increase was found in the inflamed mucosae. In both the ileum and the colon, fairly dense immunocyte populations with a marked IgG-cell predominance were encountered in the deeper layers of the inflamed bowel wall. This study confirms that a pronounced local activation of the B-cell system takes place in inflammatory bowel disease, and shows that a progressive deviation from the characteristic secretory Ig response occurs in association with increasing severity of the inflammatory process.

1731 SERUM LYSOZYME IN CROHN'S DISEASE: A USEFUL INDEX OF DISEASE ACTIVITY. (Eng.) Falchuk, K. R.; Perrotto, J. L.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 69(4):893-896; 1975.

The correlation between serum lysozyme concentration and the degree of activity of the inflammatory process in Crohn's disease (CD) was evaluated in 51 patients with CD and in 25 controls. The serum lysozyme concentration was measured only in patients with blood urea nitrogen levels lower than 22 mg/100 ml. Lysozyme levels in controls were 8.8 ± 0.4 µg/ml; in active CD, the levels were 20.8 ± 0.8 µg/ml; and in inactive CD, the levels were 10.4 ± 0.7 µg/ml. The mean lysozyme concentration for active CD patients was significantly higher than that for inactive CD patients ($p<0.001$) or controls ($p<0.001$). There was no significant difference between inactive CD and controls. In active CD cases, the correlation of lysozyme level to degree of activity was: mild, 15.6 µg/ml; moderate, 20 µg/ml; and severe, 25 µg/ml. Only patients with moderate or severe cases of CD had significantly elevated lysozyme concentrations ($p<0.02$ and $p<0.01$, resp.). Serum lysozyme levels increased with exacerbation of the disease process and decreased with any clinical improvement. Serum lysozyme concentrations may be useful as an indicator of the activity of CD and as an aid in monitoring the therapeutic responses.

1732 ANERGY TO DINITROCHLOROBENZENE AND DEPRESSION OF T-LYMPHOCYTES IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Meyers, S.; Sachar, D. B.; Taub, R. N.; Janowitz, H. D. (Mount Sinai Hosp., New York, NY 10029). *Gut* 17(11):911-915; 1976.

To evaluate cellular immunity in patients with inflammatory bowel disease, skin reactivity to dinitrochlorobenzene (DNCB) and levels of circulating T-lymphocytes were measured in 15 patients with ulcerative colitis, 15 patients with Crohn's disease, and 12 normal control subjects. Diminished reactivity to DNCB was demonstrated in 87% of patients with Crohn's disease ($p<0.001$) and in 53% with ulcerative colitis ($p<0.02$), as compared with only 8.5% of controls; anergy was more frequent in Crohn's disease than in ulcerative colitis ($p<0.05$). Levels of circulating T-lymphocytes were also depressed in both Crohn's disease and ulcerative colitis ($p<0.001$) as compared with controls, the values in Crohn's disease being lower than those in ulcerative colitis ($p<0.02$). There were no correlations of DNCB response with extent, duration, or severity of disease or with T-cell levels within any patient group. These data provide further support for the concept that there is impairment of cell-mediated immunity among many patients with chronic inflammatory bowel disease.

1733 ANAL LESIONS COMPLICATING CROHN DISEASE. (Eng.) Homan, W. P.; Tang, C. K.; Thorbjarnarson, B. (New York Hosp., 525 E. 68th St., New York, NY 10021). *Arch. Surg.* 111(12):1333-1335; 1976.

Of 503 patients with Crohn's disease, 138 (28%) developed an anorectal abscess, anal fissure, or anal fistula during the course of the disease. In 9.3% of patients, the anal lesion preceded the onset of intestinal symptoms by 2 weeks to 12 yr. Patients with large bowel disease were twice as likely to develop an anal lesion as were patients with small bowel disease. Likewise, patients with large bowel disease were twice as likely to have had an anal lesion as a presenting symptom. A patient with an anal lesion, however, was more apt to develop small bowel disease simply because the small bowel was a far commoner site of Crohn's disease in this series. Specific evidence of Crohn's disease was not found in histological examination of material from any of the patients. The cause of the anal lesions is still not clear.

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See also, 1379, 1438.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

46 ULTRASTRUCTURAL SUBSTRATE OF THE EXOCRINE
PANCREATIC SECRETORY CHANGES FOLLOWING
TAL VAGOTOMY (AN EXPERIMENTAL INVESTIGATION).
um.) Nana, M.; Neumann, E.; Dancea, S. (Clinica
irurgicala I, Romania). *Cluj. Med.* 48(1):49-52;
75.

preclinical study of the functional significance
ultrastructural morphologic modification in the
ocrine pancreas following vagotomy is presented.
e observations were made in pancreas specimens
llected from dogs at 2.5-3 months after truncal
sterior vagotomy, and examined by electron micros-
py (14,120x enlargement). Disturbances in zymo-
nesis were correlated with mitochondrial and
clear modifications in the acinar cells. The
tochondria were fewer, of normal size but with
sorganized cristae, or very small but morphologi-
lly normal. Some formed a homogenous mass due to
e disappearance of the mitochondrial membrane
showed a broken membrane slightly detached from
e endoplasmic reticulum. The nuclei were of
equal size, and had reduced perinuclear space and
creased electron microscopic optical density;
e apical pole region showed large vesicles of
ozymogen with decreased electron microscopic
tical density (prozymogen lakes). It is suggested
at the results would explain the decrease in the
sponse velocity and quantity of enzymes in the
ncreatic juice of vagotomized subjects, even
ter stimulation with physostigmine. These inves-
gations have established the necessity of selective
sterior vagotomy in the surgical treatment of
cers. The vagotomy would insure normal postopera-
ve pancreatic function, even under conditions of
ximal digestive stimulation.

7 EXOCRINE PANCREAS OF STREPTOZOTOCIN-
DIABETES RATS TREATED WITH INSULIN.
g.) Yagihashi, S. (Hirosaki Univ. Sch. Medicine,
osaki, Japan). *Tohoku J. Exp. Med.* 120(1):31-42;
76.

effect of insulin treatment on the exocrine pan-
eas of female Wistar rats with streptozotocin-
luced (50 mg/kg, i.v.) diabetes was investigated
light and electron microscopy. In diabetic rats
eated with daily lente insulin (8-20 U/day)
ection for 4 weeks, the islets became hyperplastic
proliferative, although degenerative and atrophic
ets caused by streptozotocin remained if the rats
e not treated with insulin. Fibrosis and de-
eration of the acinar cells were not found in
the diabetic rats by light microscopy. Elec-
n microscopy showed that acinar cells of the
crine pancreas of the diabetic rats that re-
ved no insulin treatment were characterized
irregular dilatation and prominent lamellar
angement of rough endoplasmic reticulum
by nuclear pyknosis. One hour after a single
ection of insulin (6 U/kg, s.c.), the rough
oplasmic reticulum of the acinar cells of the
betic rats was activated, and many intracisternal
granules appeared. When the insulin injections were continued, the acinar cells showed regular arrangement of rough endoplasmic reticulum, much less vacuolization, and fewer immature zymogen granules in comparison with those of the untreated diabetic rats. The exocrine pancreas of the insulin-treated rats contained many autophagic vacuoles, which were thought to be derived from lysosomes. These results suggest that insulin has a repairing effect on damaged acinar cells.

1748 ONSET OF CELL PROLIFERATION IN THE SHORTENED GUT: RAPID HYPERPLASIA AFTER JEJUNAL RESECTION. (Eng.) Obertop, H.; Nundy, S.; Malamud, D.; Malt, R. A. (Shriners Burns Inst. and Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 72(2):267-270; 1977.

Early manifestations of cell proliferation were studied in the large and small intestine of young female Sprague-Dawley rats after resection of the proximal one-third of the small bowel. On the day after resection, the absolute amounts of RNA and DNA increased in gut distal to the resection. As compared with values from sham-resected gut, nucleic acid levels in much of the distal small bowel and colon increased. Increased specific activity in DNA after the injection of [^{3}H]thymidine was present in the small bowel on the second day, when there was an increase of 77% in the mid small bowel from resected gut, as compared with transected gut. Changes were marked and persistent in the midgut for 10 days, tending to be less intense and of shorter duration in progressively more distal segments. Compensatory cell proliferation in midgut occurs within 2 days of jejunectomy. Identifiable proliferative responses appearing within 2 days of enterectomy provide a model for observing the response to humoral substances transferred by vascular parabiosis.

1749 ONSET OF CELL PROLIFERATION IN THE SHORTENED GUT: COLONIC HYPERPLASIA AFTER ILEAL RESECTION. (Eng.) Nundy, S.; Malamud, D.; Obertop, H.; Sczerban, J.; Malt, R. A. (Shriners Burns Inst. and Massachusetts General Hosp., Boston, MA 12114). *Gastroenterology* 72(2):263-266; 1977.

Because cell proliferation in the small bowel is greatest distal to a resected segment, and because passive dilation of the colon seems unusual compared with compensatory proliferative responses of other organs, the cytokinetics of the rat colon after ileal resection were studied. The RNA content of the transverse colon was increased 32% after 7 days; after 14 days the increase was present throughout the colon. The DNA content of the ascending colon increased 29% after 10 days. Specific activity of DNA labeled with [^{3}H]methylthymidine was elevated 29% in the ascending colon and 49% in the descending colon on the 7th postoperative day. Colonic cell proliferation was stimulated within 1 week of ileal resection. Since colonic hyperplasia precedes neoplasia, the proliferative response in colon to removal of the ileum may precondition the large bowel to the action of putative neoplastic agents in the succus entericus.

1750 RINCINOLEIC ACID EFFECTS ON RABBIT INTESTINE: AN ULTRASTRUCTURAL STUDY. (Eng.)

Gaginella, T. S.; Lewis, J. C.; Phillips, S. F. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 51(9):569-573; 1976.

Lanthanum hydroxide and ruthenium red were used as extracellular markers to study the ultrastructural effects of rininoleic acid on rabbit intestinal epithelium. In fasting animals, segments of ileum or colon were perfused for 60 min *in vivo* with buffer containing 10 mM sodium ricinoleate. Biopsy specimens were obtained from both areas of the intestine after perfusion with both control buffer and ricinoleate. Ricinoleate did not alter ruthenium or lanthanum staining in the zona occludens, zona adherens, or macula adherens of the ileal or colonic epithelium. The results suggest that ricinoleate does not cause fluid secretion by selectively disrupting the junctional areas between cells.

1751 THE DISTRIBUTION AND EARLY MORPHOLOGY OF THE CHRONIC GASTRIC MUCOSAL REACTION.

(Eng.) Lawson, H. H. (Baragwanath Hosp., Johannesburg, South Africa). *Br. J. Surg.* 63(8):585-588; 1976.

The early histological appearances of the established chronic gastric mucosal reaction (CGMR) that occurs as a result of the exposure of gastric mucosa to duodenal contents were studied in six dogs, and the reactions of different areas of the stomach to this stimulus were compared. The animals underwent a preoperative gastric biopsy and were killed 3, 6, and 12 months after Finney pyloroplasty or Billroth I gastrectomy. After either procedure, no area of the stomach was more susceptible to CGMR than other areas. Three months after surgery, epithelial proliferation was seen in the stomachs of dogs that underwent pyloroplasty, and epithelial proliferation and pseudopyloric metaplasia were seen in the gastrectomized animals. Six months after either type of surgery, intestinal metaplasia, pseudopyloric metaplasia, and mamillation were present, together with epithelial proliferation. At 3 and 6 months, the area of CGMR was greater in the animals that had undergone partial gastrectomy than that in the animals that had undergone pyloroplasty. Although CGMR was seen in the anterior wall 6 months after partial gastrectomy, this area appeared surprisingly normal after 1 yr.

1752 MODEL FOR THE STRUCTURE OF THE GASTRIC MUCOUS GEL.

(Eng.) Allen, A.; Pain, R. H.; Robson, T. R. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England). *Nature* 264(5581):88-89; 1976.

On the basis of information in the literature on the molecular structure of gastric mucous gel, the following model is proposed: the gel is composed of highly expanded, solution-filling glycoprotein molecules, when packed together, interact at or near their surfaces. Each glycoprotein molecule consists of four equal sized subunits joined by disulfid bridges. Each glycoprotein subunit consists of a protein core (14% by weight), with attached carbohydrate side chains. The protein core has two regions. One region is rich in serine, threonine, and proline and bears all the carbohydrate. The other region, of amino acid composition characteristic of globular protein, contains cystine residues that bridge the four subunits. A large proportion of the solvent is thus intramolecular, and the polymer extends more or less evenly throughout the gel. This model predicts that gel formation at a given concentration should be markedly dependent on the effective volume in solution of the glycoprotein molecule.

1753 POPULATION KINETICS OF ANTRAL GASTRIN CELLS IN THE MOUSE.

(Eng.) Lehy, T.; Willems, G. (INSERM U.-10, Hopital Bichat, 75877 Paris CEDEX 18, France). *Gastroenterology* 71(4): 614-619; 1976.

The proliferation of antral gastrin cells was studied in adult male Swiss mice. The immunoperoxidase identification on semithin Epon sections of the antral gastrin cells was combined with radioautography after single or multiple injections of [^{3}H]-thymidine. After a single injection, the nuclear uptake of [^{3}H]thymidine was observed in 0.25% of the well-differentiated gastrin cells. Ten days after six successive injections of the precursor, the labeling index reached 4.5%, indicating that the renewal of the gastrin cell population is very slow. The turnover time was estimated to be 2-4 months. Analysis of the labeling index curves obtained during and after the administration of [^{3}H]thymidine confirmed that the majority of the gastrin cells wer renewed through replication of other gastrin cells, although differentiation of a fraction of this gastrin cell population from other cells in the antrum cannot be excluded.

1754 DISTRIBUTION OF GASTRIN IN CANINE, CAT, AND HUMAN DIGESTIVE ORGANS.

(Eng.) Tobe, T.; Chen, S. T.; Hemmi, K.; Fukuchi, K. (Kyoto Univ. Medical Sch., Kyoto, 606, Japan). *Am. J. Surg.* 132(5):581-582; 1976.

The distributions of gastrin in the digestive organs of dogs and cats were determined by highly specific immunofluorescence, and these distributions were compared with that in humans. In the dogs and cats, sections were obtained from the antrum, body, and cardia of the stomach and from the duodenum, esophagus, jejunum, ileum, colon, pancreas, parotid gland, and submandibular gland. As in humans, gastrin-containing cells were found only in the antrum and duodenum of the dogs and cats. In the dogs and cats, however, gastrin-containing cells were concentrated in the duodenal bulb, and none occurred distal to the papilla of Vater.

1755 ON THE INTRINSIC INNERVATION OF NORMAL RAT LIVER: HISTOCHEMICAL AND SCANNING ELECTRON MICROSCOPICAL STUDIES. (Eng.) Skaaring, P.; Bierring, F. (Winslow Inst. Human Anatomy, Univ. Odense, DK-5000 Odense, Denmark). *Cell Tissue Res.* 171(2):141-155; 1976.

The innervation of normal rat liver was studied histochemically and by scanning electron microscopy (SEM). Using the Bodian method, stained fibers were observed in the lobules, and with the modified Karnovsky and Roots thiocholine method, cholinesterase [presumably acetylcholinesterase (AChE)]-positive nerve fibers were found in a pattern similar to that of the Bodian-stained fibers. The AChE-positive nerve fibers formed a network in the liver lobules in close relation to hepatocytes and sinusoids. Fluorescent varicose nerve fibers demonstrated by the glyoxylic acid and Falck-Hillarp fluorescence methods were found only in the interlobular spaces associated with vessels. As no overlapping of distribution patterns of AChE-positive nerve fibers and fluorescent nerve fibers occurred, the AChE activity of the nerves of the liver lobules probably reflects the associated presence of acetylcholine in the nerve fibers. Nerves of the liver lobules thus may belong to the autonomic parasympathetic nervous system. SEM revealed light cords apparently situated in smooth-surfaced channels between adjacent hepatocytes and in the space of Disse, where fibers also cross sinusoids. The cords of the SEM may represent the AChE-positive nerve fibers of the light microscopic observations.

1756 PANCREATIC DUCT CELLS: METABOLIC AND BIOCHEMICAL CHARACTERIZATION [Abstract]. (Eng.) Singh, M.; Parks, N. M.; Webster, P. D., III. (Veterans Admin. Hosp., Augusta, GA). *Clin. Res.* 25(1):50A; 1977.

1757 ISOLATION OF FUNCTIONALLY AND MORPHOLOGICALLY INTACT PANCREATIC DUCT CELLS OF THE RAT [Abstract]. (Eng.) Folsch, U. R.; Fischer, H.; Soling, H. D.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Scand. J. Gastroenterol.* 11(41):24; 1976.

1758 SPECIFIC BINDING OF [^{3}H] CAERULEIN ON RAT PANCREATIC PLASMA MEMBRANES: BINDING CHARACTERISTICS AND CORRELATION WITH ADENYLATE CYCLASE ACTIVATION [Abstract]. (Eng.) Deschodt-Lanckman, M.; Robberecht, P.; Christophe, J. (Medical Sch., Free Univ. Brussels, Brussels, Belgium). *Scand. J. Gastroenterol.* 11(41):81; 1976.

1759 THE CONTRIBUTIONS OF PANCREATIC AND BILIARY SECRETIONS AND FOOD TO THE MAINTENANCE OF MORPHOLOGY AND EPITHELIAL REPLACEMENT IN THE RAT SMALL INTESTINE [Abstract]. (Eng.) Clarke, R. M.; Ecknauer, R.; Feyerabend, G. (Depts. Clinical Chemistry and Surgery, Univ. Ulm, Ulm, W. Germany). *J. Anat.* 122(3):718-719; 1976.

1760 EPITHELIAL KINETICS IN SMALL INTESTINE OF ORALLY VS INTRAVENOUSLY ALIMENTED RATS [Abstract]. (Eng.) Assad, R. T.; Eastwood, G. L.; (West Roxbury Veterans Admin. Hosp., Boston, MA). *Clin. Res.* 24(5):627A; 1976.

1761 ADHERENCE OF E. coli TO IMMATURE INTESTINE IS MEDIATED BY MUCOSAL RECEPTORS OF MANNOSE-SPECIFIC BACTERIAL LECTINS [Abstract]. (Eng.) Thaler, M. M.; Hirschberger, M.; Mirelman, D. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Clin. Res.* 25(3):469A; 1977.

1762 FINE STRUCTURE OF THE BASAL-GRANULATED CELLS IN HUMAN FETAL DUODENUM. (Eng.) Osaka, M. (Niigata Univ. Sch. Medicine, Asahimachi, Niigata 951, Japan). *Arch. Histol. Jpn.* 34(4):307-319; 1975.

1763 SURFACE ALTERATIONS INDUCED BY STRESS IN GASTRIC MUCOSA: PROTECTIVE EFFECT OF ZOLIMIDINE: A TRANSMISSION AND SCANNING ELECTRON MICROSCOPE INVESTIGATION. (Eng.) Parisio, C.; Clementi, F. (C.N.R. Center of Cytopharmacology, Univ. Milan, Milan, Italy). *Lab. Invest.* 35(5): 484-495; 1976.

1764 DISTRIBUTION OF MARKER ENZYMES AND CYTOCHROME P-450 BETWEEN LIVER CELL SUB-POPULATIONS OF RAT LIVER [Abstract]. (Eng.) Gumucio, J. J.; DeMason, L. R.; Miller, D. L.; Kenner, M.; Krezosky, S. O. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Clin. Res.* 25(3):312A; 1977.

1765 CILIATED CELLS IN THE INTRAHEPATIC BILE DUCTULES OF THE RAT [Abstract]. (Eng.) Tansy, M. F.; Salkin, L.; Landin, W. E. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Clin. Res.* 25(3):319A; 1977.

See also, 1776, 1833, 1837, 1859, 1909, 1914, 1940, 2099, 2100, 2269, 2286, 2334, 2345, 2360, 2364, 2407, 2417, 2418, 2428, 2659.

1766 ELECTRICAL PROPERTIES OF PIG COLONIC MUCOSA MEASURED DURING EARLY POST-NATAL DEVELOPMENT.

(Eng.) Henin, S.; Smith, M. W. (Istituto di Fisiologia Generale, Via Mangiagalli 32, 20123 Milan, Italy). *J. Physiol. (Lond.)* 262(1):169-187; 1976.

Microvillar membrane (V_m) and transmural (V_t) potential differences were measured in proximal colon taken from pigs at birth and up to 10 days of age to determine whether data obtained in the pig are similar to that reported previously for other preparations of mammalian large intestine. In addition, the effect of early development on microvillar membrane permeability was investigated. V_m remained independent of the age of the animal, provided that it was measured in the absence of methionine. The over-all mean was -43.3 mV. Adding 3 mM methionine to fluid bathing the mucosal surface of newborn pig colon caused a 9.8 mV depolarization of V_m and a 6.7 mV increase in V_t. These effects, which were Na^+-dependent, were not seen in 10-day-old animals. Substituting SO_4^{2-} for Cl^- in methionine-free medium caused a hyperpolarization in V_m. Increasing the concentration of K^+ caused a corresponding depolarization. The substitution of choline for Na^+ had no effect on V_m. Cl^- and K^+ movement across the microvillar membrane together accounted for the bulk of the measured membrane potential. These results applied to all stages of development. Na^+ uptake across the microvillar membrane of the newborn pig colon was increased in the presence of methionine. This effect disappeared in older animals. Na^+ uptake in the absence of methionine doubled during the first 24 hr of postnatal life. This increase was maintained using colons taken from older animals. Methionine depolarization of V_m in the new-born pig colon is probably caused by the electrogenic influx of Na^+. The ability of the colon to actively concentrate methionine within its mucosa disappears at the same time as methionine ceases to affect V_m and V_t. Methionine and Na^+ may form a ternary complex with a carrier in the brush border of the new-born pig colon, and this carrier may be lost or modified during early postnatal development.

1767 EFFECTS OF ELECTRICAL GRADIENTS ON VOLUME FLOWS ACROSS GALL BLADDER EPITHELIUM.

(Eng.) Van Os, C. H.; Michels, J. A.; Slegers, J. F. G. (Univ. California Medical Center, Los Angeles, CA 90024) *Biochim. Biophys. Acta* 443(3): 545-555; 1976.

By continuous volumetric measurement of water flow across rabbit gallbladder epithelium, the effects of electrical gradients upon actively transporting and nontransporting (oubain-inhibited) tissues were investigated. Gallbladders were mounted as flat preparations between two half-chambers filled with Ringer solution. The mucosal solution was continuously circulated while the fluid level of a small capillary in the serosal solution was monitored photometrically to record volume flow through the epithelium. Current passing across gallbladder epithelium resulted in water flow toward the negative electrode. The water flow and osmotic potential induced by current in nontransporting membranes were entirely due to polarization of salts in the unstirred layers on either side of the membrane. Osmotic flow in nontransporting bladders was three times greater from mucosa to serosa than vice versa, and was linearly related to the current density between 300 and 900 μA in either direction. Active transport was inhibited by the addition of thiocyanate ions, indicating an anion-sensitive ATPase activity. The importance of $(Na^+ + K^+)$-ATPase in fluid reabsorption was also suggested by the Na^+/ATP ratio, which correlated well with values reported for other tissues. Volume flow across actively transporting membranes in the presence of a 200-μA current in either direction was enhanced or decreased twice as much as would be expected in a nontransporting membrane. The current-induced salt polarization interfered with the natural gradients produced by the active transport mechanism. Volume flows in actively transporting tissues were found to be twice those obtained with gallbladder sac preparations, presumably due to the greater aeration and stirring possible with the volumetric method.

1768 PROTON TRANSPORT BY GASTRIC MEMBRANE VESICLES.

(Eng.) Chang, H.; Saccomani, G.; Rabon, E.; Schackmann, R.; Sachs, G. (Lab. Membrane Biology, Univ. Alabama in Birmingham, Birmingham, AL 35294). *Biochim. Biophys. Acta* 464(2):313-327; 1977.

Proton (H^+) transport by gastric membrane vesicles was studied. A highly purified membrane fraction was derived from hog gastric mucosa by a combination of differential and density gradient centrifugation and free flow electrophoresis. This final fraction was 35-fold enriched with respect to cation activated ouabain-insensitive ATPase. The addition of ATP to this fraction or the density gradient fraction resulted in H^+ uptake into an osmotically sensitive space. The apparent Km for ATP was 1.7×10^{-4} M in the absence of a potassium (K^+) gradient. The reaction was specific for ATP, and both the rate and maximal uptake of H^+ were a function of the nature of the cation, with the sequence in descending order being K^+, rubidium, cesium, sodium, and lithium. The reaction was inhibited by ATPase inhibitors such as *N,N'*-dicyclohexylcarbodiimide. Maximal H^+ uptake occurred with an outward K^+ gradient, but the minimal apparent association constant was found in the absence of a K^+ gradient. The pH optimum for H^+ uptake was between 5.8 and 6.2, correcting for the change in H^+ released by the ATPase reaction. This corresponds generally to the pH optimum of phosphorylation of the enzyme but is considerably less than the pH maximum of the K^+-dependent dephosphorylation. In the presence of an inward K^+ gradient, protonophores, such as tetrachlorsalicylanilide, only partially abolished the H^+ gradient, while valinomycin dissipated 75% of the gradient, and nigericin abolished the gradient. The vesicles thus have a low K^+ conductance, but a measurable H^+ conductance; hence, a K^+ gradient can produce an H^+ gradient in the presence of valinomycin. The uptake and spontaneous leakage of H^+ were temperature sensitive, with the temperature optimum for uptake being 37 C. Ultraviolet ir-

diation inactivated ATPase and H$^+$ transport at
e same rate, approximately twice that of *p*-
trophenylphosphatase inactivation. It is con-
uded that H$^+$ uptake in these vesicles is probably
e to a dimeric (H$^+$ + K$^+$)-ATPase and is probably
nelectrogenic.

69 ELECTROLYTE TRANSPORT BY GALLBLADDERS OF
RABBIT AND GUINEA PIG: EFFECT OF AMPHO-
RICIN B AND EVIDENCE OF RHEOGENIC Na TRANSPORT.
ng.) Rose, R. C.; Nahrwold, D. L. (Milton S. Hershey
dical Center, 500 University Drive, Hershey, PA
033). *J. Membr. Biol.* 29(1/2):1-22; 1976.

n transport and electrical properties of rabbit and
inea pig gallbladders were investigated to gain
rther information about the active transport
echanism that mediates fluid absorption. The intra-
llular and transepithelial electrical potentials
re measured simultaneously with the microelectrode
chnique. Exposure of the mucosal surface to
photericin B (40 μg/ml) resulted in the prompt
velopment of a serosal-positive electrical poten-
ial difference (PD), which could not be attributed to
alteration in ion diffusion potentials across
ither the cell membrane or across the tight junc-
ion. Amphotericin B-induced PD was immediately
ependent on warm temperatures and O$_2$ and was in-
ependent of Na and K concentration gradients across
e cell membrane, suggesting that active ion trans-
ort is directly responsible for the PD. PD was
bolished in the absence of Na in the bathing solu-
ions, indicating that a rheogenic Na pump may be
nvolved; this pump also appeared to be operative
n tissue not exposed to amphotericin B. The
esults indicate that ion transport by rabbit gall-
ladder *in vitro* is a consequence of a rheogenic
ctive Na transport mechanism at the basolateral
embranes, which, in conjunction with a coupled
aCl influx process at the mucosal border ulti-
ately results in absorption of NaCl and water.

770 INTESTINAL ADAPTATION TO DIETARY CALCIUM
RESTRICTION: IN VIVO CECAL AND COLONIC
ALCIUM TRANSPORT IN THE RAT. (Eng.) Petith, M.
.; Schedl, H. P. (Univ. Iowa Hosp., Iowa City,
A 52242). *Gastroenterology* 71(6):1039-1042; 1976.

o examine the role of the cecum and colon in cal-
ium homeostasis, weight-matched growing Sprague-
awley rats were placed on semisynthetic diets
ontaining 1.2 or 0.02% calcium. After 3-4 weeks,
et calcium movements in cecum and colon (large
owel excluding cecum and distal rectum) were stud-
ed *in vivo* by perfusing a 0.4, 0.8, or 3.4 mM
alcium solution. In animals taking 1.2% calcium,
he cecum absorbed calcium actively at 0.8 mM; the
olon showed net secretion except at 3.4 mM. In
alcium-restricted animals, the cecum absorbed at
ll concentrations; the colon reduced secretion at
.4 mM, converted to net absorption at 0.8 mM, and
reatly increased net absorption at 3.4 mM. These
bservations suggest that the large intestine may
ave a role in calcium homeostasis, particularly
hen dietary calcium is restricted.

1771 INHIBITION OF INTESTINAL IRON ABSORPTION BY LAUNDRY STARCH. (Eng.) Thomas, F. B.; Falko, J. M.; Zuckerman, K. (N-937 University Hosp., Ohio State Univ., 410 W. 10th Ave., Columbus, OH 43210). *Gastroenterology* 71(6):1028-1032; 1976.

In vitro and *in vivo* studies were carried out in female Sprague-Dawley rats to determine the effect of laundry starch on the intestinal absorption of inorganic and hemoglobin iron. *In vitro*, laundry starch bound 19-80% of the available ^{59}FeSO$_4$ and 34-68% of the available ^{59}Fe-hemoglobin. Binding of both forms of iron was pH-dependent, with maximal binding at pH 7.0. *In vivo*, laundry starch significantly inhibited mucosal uptake of ^{59}FeSO$_4$ from isolated duodenal loops. In nonanemic rats, the administration of laundry starch (100 mg) 1 hr before a 100-μg dose of ^{59}FeSO$_4$ significantly decreased the absorption of ^{59}FeSO$_4$, as compared to saline or low iron chow controls (6.2 ± 2.0 versus 14.9 ± 2.1 and 11.8 ± 1.7, resp., $p<0.001$). In anemic rats, the absorption of either a 100-μg dose of ^{59}FeSO$_4$ or a 500-μg dose of ^{59}Fe-hemoglobin was also significantly decreased by prior administration of laundry starch. The data indicate that laundry starch binds appreciable quantities of inorganic and hemoglobin iron *in vitro*; inhibits the mucosal uptake of inorganic iron by isolated intestinal loops; inhibits the intestinal absorption of inorganic iron in normal nonanemic rats; and blunts the compensatory increase in inorganic and organic iron absorption in anemic rats. The ingestion of large quantities of laundry starch by patients with amylophagia may inhibit iron absorption and contribute to the development of the iron deficiency anemia seen in these patients.

1772 THE ABSORPTION OF ACETYLSALICYLIC ACID FROM THE STOMACH IN RELATION TO INTRAGASTRIC pH. (Eng.) Dotevall, G.; Ekenved, G. (Sahlgren's Hosp., Univ. Goteborg, Goteborg, Sweden). *Scand. J. Clin. Lab. Invest.* 36(6):801-805; 1976.

The effects of buffered (pH 6.5) versus unbuffered (pH 2.9) solutions of acetylsalicylic acid (ASA) on gastric pH, gastric emptying, and gastric absorption of ASA were studied in 10 healthy volunteers. The buffered solution contained 500 mg ASA, 500 mg citric acid, and 1,250 mg sodium bicarbonate in 150 ml water. The unbuffered test solution contained 500 mg ASA dissolved in 150 ml water. Both test solutions also contained 35 mg of phenol red, which was used as nonabsorbable marker. The mean pH of the first aspirate from subjects given the buffered solution was 3.4 (range, 1.8-6.2), in comparison with a mean pH of 2.0 (range, 1.8-2.2) for the first aspirate from subjects given the unbuffered solution of ASA. Total recoveries of phenol red and ASA were significantly larger for the unbuffered test solution than for the buffered one ($p<0.05$). The mean phenol red and ASA recoveries for subjects given the buffered ASA solution were 12.7% (range, 0.0-48.3%) and 12.4% (range, 0.4-50.3%), resp., as compared with 28.7% (range, 0.3-84.8%) and 22.7% (range, 0.7-78.2%), resp., for subjects given unbuffered solution. Peak plasma salicylate concentrations were virtually the same with buffered and unbuffered ASA test solutions. These results support the theory that the reduced gastric side-effects with effervescent buffered ASA tablets, might be ascribed to a reduced gastric absorption of ASA.

1773 STRUCTURAL LOCUS OF TRANSMUCOSAL ALBUMIN EFFLUX IN CANINE ILEUM: A FLUORESCENT STUDY.

(Eng.) Granger, D. N.; Cook, B. H.; Taylor, A. E. (Univ. Mississippi Sch. Medicine, 2500 N. State St., Jackson, MS 39216). *Gastroenterology* 71(6):1023-1027; 1976.

The histological locus (villus tips versus crypts) of plasma protein loss in the small intestine after elevation of intestinal venous pressure was determined by using the Evans blue-albumin fluorescence technique in dog ileum. Evans blue was mixed with a solution of bovine serum albumin at concentrations that yield negligible amounts of free dye. Control ileal samples were obtained to visualize the natural tissue morphology and fluorescence. The Evans blue-albumin solution was injected, and tissue samples were obtained 15 and 60 min postinjection, then venous outflow was occluded, and after 15 and 60 min, the tissues were sampled. No leakage sites were apparent at normal venous pressures. However, after elevation of venous pressure, Evans blue-albumin was observed in the interepithelial and/or intraepithelial spaces of villus tips, but no Evans blue-albumin was observed either between or within the epithelial cells of the crypts or within the tubular crypt lumina. These results indicate that at elevated venous pressures, the transmucosal albumin flux occurs exclusively at the villus tip region, suggesting a great vulnerability of the cells found in this region to elevations in tissue pressure, as compared to the crypt epithelial cells.

1774 INFLUENCE OF VIABILITY ON BROMOSULFOPHTHALEIN UPTAKE BY ISOLATED HEPATOCYTES.

(Eng.) Schwenk, M.; Burr, R.; Pfaff, E. (Institut fur Toxikologie der Universitat Tubingen, Wilhemstrasse 56, D-7400 Tubingen, W. Germany). *Naunyn-Schmiedeberg's Arch. Pharmacol.* 295(1):99-102; 1976.

BSP uptake was studied as a function of hepatocyte viability in isolated liver cells. Hepatocyte viability was decreased by ageing on storage as a concentrated stock suspension at 2 C. Viability was judged by trypan blue stainability, membrane potential, and respiratory parameters indicative for energy state, substrate supply, and plasma membrane permeability changes. At high BSP concentrations, BSP uptake increased concomitantly with impaired viability; at low concentrations, BSP decreased, with a crossover point at 10 μM. The crossover point was manifest in an increase in K_m (7 ± 3 μM with viable cells and 25-66 μM for cells with low viability) and V (2.7 % 1.6 nmol/mg protein x min with viable cells; 7-10 nmol/mg x min with low viability). Simultaneously, the affinity and size of the membrane-bound fraction decreased. The results support the hypothesis that it is the decreased uptake from plasma to liver that is responsible for the prolonged plasma retention times in the liver function test of patients with impaired hepatobiliary function.

1775 LECITHIN INHIBITS FATTY ACID AND BILE SALT ABSORPTION FROM RAT SMALL INTESTINE IN VIVO.

(Eng.) Saunders, D. R.; Sillery, J. (Dept. Medicine, Univ. Washington, Seattle, WA 98195). *Lipids* 11(12):830-832; 1976.

To test the hypothesis that an impairment in small intestinal lecithin hydrolysis would result in a depression of free fatty acid (FFA) and bile salt absorption, isolated segments of rat small intestine were infused *in vivo* with micellar solutions of 2 mM linoleic acid and 10 mM taurocholate to which was added 3 mM 1-palmitoyl, 2-oleoyl lecithin, or 1-palmitoyl lysolecithin. Absorption of FFA and bile salt was measured under steady state conditions using a single-pass technique. Lecithin depressed the rate of FFA absorption by 40% ($p<0.025$) in jejunal and ileal segments, whereas lysolecithin was associated with normal rates of FFA absorption. Lecithin also reduced taurocholate absorption from the ileum by 30% ($p<0.05$). These data support the hypothesis that lecithin may depress FFA and bile salt absorption from the small intestine in pancreatic insufficiency.

1776 STUDIES ON TRANSLOCATION OF IMMUNOGLOBULINS ACROSS INTESTINAL EPITHELIUM. II. IMMUNOELECTRON-MICROSCOPIC LOCALIZATION OF IMMUNOGLOBULINS AND SECRETORY COMPONENT IN HUMAN INTESTINAL MUCOSA.

(Eng.) Brown, W. R.; Isobe, Y.; Nakane, P. K. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Gastroenterology* 71(6):985-995; 1976.

To define mechanisms involved in the transport of immunoglobulins into intestinal fluids, IgM, IgA, IgG, and secretory component (SC) were localized in human intestinal mucosa by the peroxidase-labeled antibody technique. Light microscopy revealed that immunocytes containing IgA, IgM, or IgG were located in the lamina propria. IgA, IgM, and SC were prominent in the epithelium of gland crypts. IgG was limited to a few cells at villous tips. At the electron microscopic level, SC was localized to perinuclear spaces, endoplasmic reticulum, saccules associated with Golgi complexes, cytoplasmic vesicles, and lateral and basal plasma membranes of columnar epithelial cells. IgA and IgM, but not IgG, also were localized to plasma membranes and cytoplasmic vesicles of these cells. Neither the immunoglobulins nor SC was found within other types of epithelial cells (Paneth, goblet, endocrine). The findings suggest that the site of SC synthesis in intestinal epithelium is secretory columnar cells, principally those in gland crypts; that the polymeric IgM and IgA are translocated through such SC-containing cells by a process involving the formation of cytoplasmic vesicles; that IgM and IgA could combine with SC during transcellular transport (likely sites are lateral or basal plasma membranes or supranuclear cytoplasm); and that the monomeric IgG does not share the transepithelial cell route involved in IgM and IgA transport.

7 METHOD FOR STUDYING THE INTESTINAL ABSORPTION OF MONOSACCHARIDES IN VIVO IN THE RAT.

.) Galluser, M.; Pousse, A.; Ferard, G.; Gren-
, J. F. (UER Sciences Pharmaceutiques, Rue de
gonne, 67083 Strasbourg, France). *Biomedicine*
):127-132; 1976.

thod for *in vivo* perfusion of isolated jejunal
ileal loops with catheterization of the efferent
s in male Wistar rats is described. A segment
he jejunum and a segment of the ileum, each 20
ong, were isolated. Ringer's solution, with
-labeled D-glucose (5.5 mM), was perfused through
lumen of the isolated segments at the rate of
ml/min. The iliac arteries were catheterized
a simultaneous perfusion of blood pooled from
rats. Hemodynamic and histological results
ed the isolated segments retained the ability to
rb D-glucose for 1 hr. D-glucose was absorbed
er by the jejunum (0.217 μM/min/g) than by the
m (0.095 μM/min/g, $p<0.01$). This experimental
ocol appears to be the method of choice for the
y of the process of absorption in the intestinal
sa.

3 RELATIONSHIPS BETWEEN MUCOSAL HYDROLYSIS AND TRANSPORT OF TWO PHENYLALANINE DIPEP-
ES.

(Eng.) Silk, D. B. A.; Nicholson, J. A.;
, Y. S. (King's Coll. Hosp., London S.E.5, Eng-
). *Gut* 17(11):870-876; 1976.

dies were carried out to investigate the source
free amino acids found in the gut lumen during
rption of dipeptides and to determine the role
rush border peptidases in the mucosal hydro-
is of dipeptides during absorption. The rates
dipeptide disappearance and appearance of hydro-
c products were measured during perfusion of
jejunum and ileum *in vivo* with buffered and
ffered 10 mM solutions of glycyl-L-phenylalanine
-Phe) and L-phenylalanyl-glycine (Phe-Gly).
sal brush border peptidase activity was then
ured in the perfused segments *in vitro* at luminal
nd at two substrate concentrations. In addition,
sol peptidase activity in the perfused segments
measured at pH 7.4 and at 10 mM substrate con-
rations. In the jejunum, there was a relation
een rates of free phenylalanine appearance
ivo (Phe-Gly>Gly-Phe) and rates of brush border
-Gly>Gly-Phe) rather than cytosol (Gly-Phe>Phe-
) peptidase activities. No constant relation
een free phenylalanine appearance and hydrolysis
he dipeptides by either brush border or cytosol
idases was observed in the ileal studies. These
ings suggest that hydrolytic products in the
num originate from the surface of the cell, where-
ydrolytic products in the ileum originate from
the intracellular compartment and the surface
he mucosal cell. In the jejunum, *in vitro* rates
rush border hydrolysis of Gly-Phe were always
than *in vivo* disappearance rates, whereas rates
Phe-Gly brush border hydrolysis always exceeded
nal disappearance rates. These data imply that
-Phe is predominantly transported intact and
rolysed by cytosol peptidase. In contrast, brush
der peptidases play an important role in the
osal hydrolysis of Phe-Gly.

1779 INHIBITORY EFFECT OF PANCREATIC JUICE ON THE INTESTINAL UPTAKE OF VITAMIN B_{12}.

(Eng.) von der Lippe, G. (N-5016 Haukeland sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11(7):697-703; 1976.

Studies were carried out to determine whether rat pancreatic juice (RPJ) is able to inhibit the intestinal uptake of vitamin B_{12}-intrinsic factor. RPJ reduced the mean uptake of $^{57}CoB_{12}$ bound to rat intrinsic factor (IF) by perfused rat intestinal segments from 30.1 ± 2.4 pg $^{57}CoB_{12}$/cm intestine to 26.7 ± 2.4 pg/cm ($p<0.05$). RPJ activated with enterokinase reduced the uptake from 22.8 ± 2.8 pg/cm to 16.1 ± 1.9 ($p<0.05$). RPJ also reduced the uptake from 15.8 ± 2.3 pg/cm to 8.3 ± 2.0 pg/cm ($p<0.01$) in segments from partially pancreatectomized rats. Rat bile abolished the inhibitory effect of RPJ. The results indicate that in the absence of bile, the exocrine pancreatic secretion is capable of inhibiting the intestinal uptake of vitamin B_{12}.

1780 THE ABSORPTION OF VITAMIN B_{12} AFTER SUBTOTAL PANCREATECTOMY IN THE RAT.

(Eng.) von der Lippe, G. (N-5016 Haukeland sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11(7):683-688; 1976.

Vitamin B_{12} absorption was studied in male Wistar rats after they had undergone subtotal pancreatectomy by a new method. Except for a small remnant along the splenal hilus, the gland was completely removed. Exocrine pancreatic insufficiency was confirmed by fat and nitrogen malabsorption, and moderate diabetes mellitus was seen. Insulin substitution or diet restriction was unnecessary. The absorption of vitamin B_{12} after the p.o. administration of $^{57}CoB_{12}$ (10 ng) was 5.0 ± 0.2 ng $^{57}CoB_{12}$ in unoperated rats and 5.1 ± 0.1 ng in pancreatectomized rats ($p<0.05$). The p.o. administration of pancreatic extract (PE, 100 mg) increased the mean absorption of $^{57}CoB_{12}$ in unoperated rats to 129.3 ± 7.9% of the absorption of $^{57}CoB_{12}$ given alone ($p<0.01$), but not in pancreatectomized rats ($p<0.2$). PE (300 mg) reduced the absorption in unoperated rats to 46.1 ± 5.3% ($p<0.01$). The results indicate that an optimal amount of pancreatic secretion may stimulate the absorption of vitamin B_{12}.

1781 EFFECT OF SEROTONIN ON WATER AND ELECTROLYTE TRANSPORT IN THE IN VIVO RABBIT SMALL INTESTINE.

(Eng.) Kisloff, B.; Moore, E. W. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 71(6):1033-1038; 1976.

The influence of i.v.-administered serotonin on water and electrolyte fluxes in the *in vivo* rabbit jejunum and ileum and the effect of glucose on serotonin-induced changes were examined. The animals were divided into four groups: those receiving saline, i.v., while a glucose-free isotonic saline solution perfused the jejunum and ileum;

those given serotonin (20 µg/kg/min), i.v., while glucose-free intestinal perfusate was used as in group 1; those given i.v. saline, while a 10 mM glucose-isotonic saline solution perfused the jejunum and ileum; and those given i.v. serotonin, while the intestinal perfusate was used as in group 3. Serotonin administration resulted in highly significant net secretion of H_2O and sodium in both jejunum and ileum in the groups with a glucose-free perfusate. In the jejunum, serotonin evoked net water and sodium secretion (+42.0 µl/cm/hr and +5.6 µEq/cm/hr, resp.), whereas controls absorbed water and sodium (-16.1 µl/cm/hr and -3.4 µEq/cm/hr, resp., $p<0.001$ for both water and sodium). In the ileum, serotonin significantly enhanced net water (from 59.4 to 127.4 µl/cm/hr, $p<0.001$) and net Na secretion (from 1.7 to 8.0 µEq/cm/hr, $p<0.001$). The addition of glucose to the perfusate completely abolished the serotonin effect. Unidirectional ^{22}Na flux analysis revealed a marked diminution in both mucosal to serosal and serosal to mucosal fluxes in serotonin-treated animals. The decrease in mucosal to serosal flux was greater than the decrease in serosal to mucosal flux, thus explaining the enhanced net secretion observed with serotonin in the groups receiving glucose-free perfusate. In spite of its pronounced effect on water and electrolyte transport, serotonin failed to produce any detectable histological alterations in small bowel mucosa, either by light or electron microscopy. Serotonin may be an important mediator of the diarrhea seen in the carcinoid syndrome, because of its effects on small intestinal H_2O and electrolyte transport.

1782 INTESTINAL ABSORPTION OF DRUGS FROM SOLUBILIZED SYSTEMS OF LONG-CHAIN FATTY ACIDS IN THE RAT. (Eng.) Inui, K. I.; Shintomi, M.; Hori, R.; Sezaki, H. (Hiroshima Univ. Sch. Medicine, Kasumi 1-2-3, Hiroshima, Japan). *Chem. Pharm. Bull.* 24(10):2504-2508; 1976.

1783 BARBITURATE TRANSPORT ACROSS RAT JEJUNUM IN VITRO [Abstract]. (Eng.) Jackson, M. J.; Airall, A. A. (George Washington Univ. Medical Center, Washington, DC 20037). *Fed. Proc.* 36(3): 540; 1977.

1784 EFFECT OF PHENOLPHTHALEIN ON IN VITRO RABBIT ILEAL ELECTROLYTE TRANSPORT [Abstract]. (Eng.) Powell, D. W. (Dept. Medicine, Univ. North Carolina, Chapel Hill, NC). *Clin. Res.* 25(3): 316A; 1977.

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1786 PRELIMINARY STUDIES ON THE ABSORPTION, DISTRIBUTION AND EXCRETION OF N-(2-HYDROXYETHYL)-MALEOPIMARIMIDYL MORPHOLIDE (^{3}H-RU 18492) IN THE FEMALE RAT AND DOG. (Eng.) James, G. W. L.; Ramm, P. J.; Taylor, J. B.; Luscombe, D. K.; Nicholls, P. J. (Roussel Labs. Ltd., Kingfisher Drive, Covingham, Swindon, Wiltshire, England). *Arzneim. Forsch.* 26(12):2193-2197; 1976.

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1789 STRICT VALIDATION CRITERIA REQUIRED FOR THE ASSESSMENT OF INTESTINAL TRANSPORT PROCESSES USING HUMAN JEJUNAL MUCOSAL BIOPSIES [Abstract]. (Eng.) Thomson, A. B. R.; Weinstein, W. M. (Dept. Medicine, Univ. Alberta, Edmonton, Canada). *Clin. Res.* 25(2):113A; 1977.

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796 ION TRANSPORT ACROSS THE IN VITRO CECUM OF THE RAT [Abstract]. (Eng.) Estep, J. .; Loeschke, K.; Goldner, A. M. (Univ. Arizona edical Center, Tucson, AZ 85724). *Fed. Proc.* 6(3):510; 1977.

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1798 ABSORPTION AND ENDOGENOUS FAECAL EXCRETION OF CALCIUM BY LOW BIRTHWEIGHT INFANTS ON FEEDS WITH VARYING CONTENTS OF CALCIUM AND PHOSPHATE. (Eng.) Barltrop, D.; Mole, R. H.; Sutton, A. (Paediatric Unit, St. Mary's Hosp. Medical Sch., London W2 1PG, England). *Arch. Dis. Child.* 52(1): 41-49; 1977.

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1802 VITAMIN D DEPENDENT CALCIUM-BINDING COMPLEX: ENZYMATIC ACTIVITIES [Abstract]. (Eng.) Kowarski, S.; Schachter, D. (Dept. Physiology, Columbia Univ., New York, NY). *Clin. Res.* 24 (3):433A; 1976.

1803 COUPLED NaCl TRANSPORT IN TELEOST INTESTINE: ROLE OF THE PARACELLULAR SHUNT PATHWAY IN GENERATING THE SEROSA NEGATIVE PD [Abstract]. (Eng.) Field, M.; Smith, P. L.; Bolton, J. E.; Karnaky, K. A.; Kinter, W. B. (Mt. Desert Island Biology Lab., ME). *Fed. Proc.* 36(3):539; 1977.

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1806 ABSORPTION OF SELENITE AND SELENOMETHIONINE FROM LIGATED DIGESTIVE TRACT SEGMENTS IN RATS. (Eng.) Whanger, P. D.; Pedersen, N. D.; Hatfield, J.; Weswig, P. H. (Dept. Agricultural Chemistry, Oregon State Univ., Corvallis, OR 97331). *Proc. Soc. Exp. Biol. Med.* 153(2):295-297; 1976.

1807 PREFERENTIAL TRANSPORT OF HORSERADISH PEROXIDASE BY M CELLS OVER PEYER'S LYMPHOID FOLLICLES [Abstract]. (Eng.) Owen, R. L.; Jones, A. L. (Veterans Admin. Hosp., San Francisco, CA). *Clin. Res.* 24(3):434A; 1976.

1808 IMPAIRMENT OF SALICYLATE UPTAKE FROM RAT SMALL INTESTINE FOLLOWING PRETREATMENT WITH A FOLIC ACID ANTAGONIST. (Eng.) Bowring, N. E.; May, D. S. (Beecham Pharmaceuticals Res. Div., Medicinal Res. Centre, Harlow, Essex, England). *J. Pharm. Pharmacol.* 28(2):175-176; 1976.

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1810 DIFFERENCES IN FOLATE TRANSPORT AND DISTRIBUTION CAUSED BY FOLATE BINDING PROTEIN (FABP) [Abstract]. (Eng.) Rubinoff, M.; Abramson, R.; Schreiber, C.; Waxman, S. (Mount Sinai Sch. Medicine, New York, NY). *Clin. Res.* 25(3):317A; 1977.

1811 THE EFFECTS OF NON-TRANSPORTABLE COMPETITIVE INHIBITORS OF SUGAR TRANSFER ON THE SHORT-CIRCUIT CURRENT OF THE RAT EVERTED SMALL INTESTINE. (Eng.) Muflih, I. W.; Widdas, W. F. (Dept. Physiology, Bedford Coll., London NW1 4NS, England). *J. Physiol.* 254(1):50P-51P; 1976.

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1813 EFFECT OF ACTIVELY TRANSPORTED HEXOSES ON AFFERENT NERVE DISCHARGE FROM RAT SMALL INTESTINE IN VIVO. (Eng.) Sanford, P. A. (Middlesex Hosp. Medical Sch., London, W.1, England). *J. Physiol.* 254(1):75P-76P; 1976.

1814 PRELIMINARY STUDIES OF RIBOFLAVIN ABSORPTION BY IN VITRO SMALL INTESTINE OF RAT AND BULLFROG [Abstract]. (Eng.) Fox, K. R.; Rindi, G.; Ventura, U.; Cusaro, G. (Univ. Texas Medical Sch., Houston, TX 77030). *Fed. Proc.* 36(3):455; 1977.

1815 WATER DIFFUSION THROUGH INTESTINAL MUCUS [Abstract]. (Eng.) Lukie, B. E. (Dept. Medicine, Univ. Saskatchewan, Saskatoon, Canada). *Clin. Res.* 25(2):111A; 1977.

1816 INFLUENCE OF IN VITRO TECHNIQUE ON THE KINETIC CONSTANTS FOR INTESTINAL TRANSPORT DERIVED IN THE PRESENCE OF AN UNSTIRRED WATER LAYER (UWL) [Abstract]. (Eng.) Thomson, A. B. L.; Dietschy, J. M. (Univ. Texas Health Science Center, Dallas, TX). *Clin. Res.* 24(5):667A; 1976.

1817 MEMBRANE STABILIZATION AND LYSIS; RELATIONSHIP TO INTESTINAL WATER INHIBITION [Abstract]. (Eng.) Gullikson, G. W.; Bass, P. (Univ. Wisconsin, Madison, WI 53706). *Fed. Proc.* 36(3): 455; 1977.

1818 EFFECT OF THE UNSTIRRED WATER LAYER ON THE AGE-DEPENDENT CHANGES IN INTESTINAL TRANSPORT OF D-GLUCOSE [Abstract]. (Eng.) Thomson, A. B. R.; Hart, L. (Div. Gastroenterology, Univ. Alberta, Edmonton, Alberta, Canada). *Clin. Res.* 25(2): 113A; 1977.

1819 EXPERIMENTAL DEMONSTRATION OF THE EFFECT OF THE UNSTIRRED WATER LAYER ON THE KINETIC CONSTANTS OF THE MEMBRANE TRANSPORT PROCESS FOR D-GLUCOSE IN RABBIT JEJUNUM [Abstract]. (Eng.) Thomson, A. B. R.; Dietschy, J. M. (Div. Gastroenterology Univ. Alberta, Edmonton, Canada). *Clin. Res.* 25(3): 320A; 1977.

1820 ENHANCED FLUID TRANSFER BY THE GALL-BLADDER FOLLOWING INTRAVESICULAR PRESSURE CHANGES INDUCED BY SPASMOGENS. (Eng.) Morton, I. K. M.; Saverymuttu, S. H.; Wood, J. R. (Dept. Pharmacology, King's Coll., London, W.C.2, England). *J. Physiol.* 254(1):82P-83P; 1976.

1821 THE BINDING OF ORGANIC ANIONIC DYES TO HEPATOCELLULAR PLASMA MEMBRANES [Abstract]. (Eng.) Riechen, J.; Blitzer, B. L.; Berk, P. D. (Natl. Inst. Arthritis, Metabolic, and Digestive Diseases, Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 25(3):468A; 1977.

See also, 1875, 1907, 2020, 2120, 2123, 2323, 2600, 2605, 2617, 2663.

2 TRANSDUCER FOR RECORDING ELECTRICAL AND MECHANICAL CHRONIC INTESTINAL ACTIVITY.

;.) Lambert, A.; Eloy, R.; Grenier, J. F. (Unite
INSERM, Surgical Res. and Biophysiopathology
he Intestine, 67200 Strasbourg Hautepierre,
ce). *J. Appl. Physiol.* 41(6):942-945; 1976.

xtraluminal displacement transducer for simul-
ously recording the mechanical activity in
perpendicular directions and the electrical
vity of the intestinal serosa is described.
length variations in two perpendicular directions
measured by means of strain gauges bonded on
pairs of lamellae embedded in a rigid stand.
electrical activity was recorded by means of
electrodes placed at the extremity of these
llae. The electrical gauges of each pair of
llae are connected to form a Wheatstone bridge.
device allows the establishment of a correla-
between the mechanical displacement of the
stinal wall serosa and electrical potentials
eans of long-term studies.

3 ELECTRICAL POTENTIAL OF GASTRODUODENAL MUCOSA MEASURED BY ENDOSCOPY. (Eng.)

ino, G. E.; Ascher, N. V.; Borner, J. W.; Johnson,
J.; Goodale, R. L. (Dept. Surgery, Univ. Minne-
Health Sciences Center, Minneapolis, MN).
. Gynecol. Obstet. 144(1):8-12; 1977.

troduodenal mucosal electrical potentials were
sured in 33 patients with inflammatory-ulcerative
ions and in 17 healthy controls. The negative
ctrical potential of the gastroduodenal mucosa
respect to the blood stream was measured by
necting a potentiometer to an i.v. and an intra-
tric electrode. A fiberoptic gastroduodenoscope
used to introduce and position the probe elec-
de into the stomach and duodenum. Recordings tak-
in nine patients with gastric ulcers ranged from
to -26 mV, in comparison with normal readings that
e generally over -30 and as high as -50 mV.
drops in potential difference from normal for 6
ients with acute gastritis, 2 with chronic gastri-
, 1 with atrophic gastritis, 14 with erosive
ions, and 3 with erosive-hemorrhagic lesions were
3.6, 17 ± 7.1, 29 ± 7.7, 18 ± 5.1, and 27 ± 4.2
resp. Potential difference values measured in
e duodenal ulcer patients were also consistentlyy
ow normal levels, and the potential difference
p in the duodenum had an absolute value that
ged from -4 to -7 mV. In general, a deflection
the potential difference value toward zero
racterized any disruption of the normal
osa. Localized lesions reproduced localized
ential difference deflections, and atrophic le-
ns were represented by larger areas of abnormal po-
tial difference levels. Direct multiple deter-
ations of potential differences over mucosal
as in which lesions are suspected is a useful
simple tool for more objective gastroduodenosco-
diagnoses.

4 INTRALUMINAL PRESSURE IN THE SIGMOID COLON. I. METHOD AND RESULTS IN NORMAL

JECTS. (Eng.) Weinreich, J.; Andersen, D. (Surgical Univ. Clinic I, Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 11(6): 577-580; 1976.

A modified method for the measurement of intraluminal pressure in the sigmoid colon and the results of experiments in which 12 healthy subjects underwent the procedure 30 min after the i.v. administration of 0.5 mg neostigmine are described. The bowel is prepared by a single phosphate enema, followed by overnight fasting. Two catheters are placed 10 and 25 cm from the anal verge through a sigmoidoscope. The higher catheter is inserted blindly from the rectosigmoid junction, minimizing the need for air insufflation and making the examination more tolerable for the subject. The position is checked after visualization of the catheters by 10 ml of water soluble contrast medium. Water is infused continuously through the catheters for fecal clearing. The median motility index was 597, with a range of 125 to 1,169. Variance analysis of repeated measurements showed that variation from subject to subject exceeded the day-to-day variation ($p<0.01$). Identical results were obtained for mean wave amplitude and activity percentage. The interperson variation also exceeded variation in computation of records ($p<0.01$ for all three parameters). Mean wave amplitude, activity percentage, and motility index increased in one patient who was given increasing doses of neostigmine (0.25, 0.5, and 1.0 mg). This technique reduces the total examination time to about 75 min. It gives an acceptably low day-to-day variation, and demonstrates the range of variation between normal persons as a frame of reference for later comparison with groups of patients with colonic disorders.

1825 INSULIN RESISTANCE AND RELATED ELECTRICAL ACTIVITY OF THE SMALL INTESTINE. (Eng.)

Ruckebusch, M.; Weekes, T. E. C. (Ecole Nationale Veterinaire, 23, chemin des Capelles, F-31076 Toulouse Cedex, France). *Experientia* 32(9):1163-1165; 1976.

To test the hypothesis that endogenous insulin plays a role in the control of small intestinal electrical activity, the postprandial intestinal electrical activity was studied in hyperinsulinemic and normal Zucker rats and in an insulin-resistant dog. Five obese and five lean Zucker rats were allowed food *ad libitum* from 1800-0800 hr over a 6-week period. The previously described pattern of migrating myoelectric complex (MMC) was seen from 0800 to 1800 hr (food withheld), and the postprandial pattern (i.e., continuous spiking with randomly occurring spike bursts) was seen from 1800 to 0800 hr in both lean and obese rats. However, the postprandial disruption of the MMC was of longer duration in the obese rats than in the nonhyperinsulinemic animals the mean number of MMC per hour averaging 2.6-3.4 in the latter and 1.2-1.6 in the former. No postprandial disruption was seen in an insulin-resistant dog. The results support the concept that insulin plays a major role in the control of gut electrical spiking activity.

1826 THE EFFECTS OF VIP ON INTESTINAL MOTILITY: STUDY ON EX VIVO PERFUSED ISOLATED CANINE JEJUNAL LOOPS. (Eng.) Kachelhoffer, J.; Mendel, C.; Dauchel, J.; Hohmatter, D.; Grenier, J. F. (U-61 Inserm, Avenue Moliere, 67200 Strasbourg Hautepierre, France). *Am. J. Dig. Dis.* 21(11):957-962; 1976.

The effects of vasoactive intestinal peptide (VIP) on intestinal motility were studied in isolated canine jejunal loops *ex vivo* perfused at normothermia under pulsatile flow with heparinized, oxygenated, and nonrecirculated canine whole blood, by means of an intraluminal balloon. VIP was administered intra-arterially either by 1-min injections or by 10-min infusions. For arterial concentrations of the polypeptide ranging between 25 pg/ml and 300-500 pg/ml, a fast but temporary relaxant effect was observed. For higher concentrations, VIP usually produced a biphasic response. The relaxant effect was followed by an increase of the basal muscular tone, often accompanied, for concentrations greater than 25 ng/ml, by a marked and transient increase in amplitude of the intestinal rhythmic contractions. During extended infusions, a biphasic response was also observed, but both effects were of short duration. A cholinergic origin of the secondary contracting phase was expected, but could not be demonstrated because, at blood concentrations at which atropine affected the biphasic response (10 μg/ml blood), not only was the contractile effect abolished, but the initial relaxing phase was abolished as well. It is suggested that the secondary contraction may be a "rebound excitation" of myogenic nature or a result of noncholinergic excitatory fiber stimulations. The short-term relaxant effect observed under the present conditions, even during long-time infusion of the polypeptide, fails to support an important physiological role of VIP as an hormonal inhibitor of intestinal motility. The biphasic response, however, might have a physiological significance as far as the aboral propulsion of the intestinal content requires a muscular inhibition that rapidly changes to contraction.

1827 ALTERED SMALL BOWEL PROPULSION ASSOCIATED WITH PARASITISM. (Eng.) Castro, G. A.; Badial-Aceves, F.; Smith, J. W.; Dudrick, S. J.; Weisbrodt, N. W. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 71(4):620-625; 1976.

Experiments were carried out in Sprague-Dawley rats to test the hypothesis that alterations of intestinal motility accompany enteric helminth infections. Motility was measured during the intestinal phase of infection with *Trichinella spiralis* by following the transit of radioactive chromium through the gut. Intraduodenal catheters were surgically implanted in rats. One week after the operation, one group of animals was infected with 8 x 10^3 *T. spiralis* larvae, and a second group was infected with 16 x 10^3 larvae. A third group of uninfected rats served as controls. $Na_2{}^{51}CrO_4$ was injected through the catheter into the duodenum of fasted animals 3, 4, or 5 days postinfection, and its propulsion through the small bowel was allowed to progress for 15 min. The distribution of radioactivity throughout the small intestine and cecum was then plotted as a func tion of gut length. Intestinal transit was increased significantly by infection. The leading edge of radioactivity traversed 100% of the gut length in infected rats and 70% in controls. The amount of injected radioactivity traversing the midpoint of the small intestine was estimated by regression equations to be 38% of the injected dose for control rats and 59 and 57% for infected groups, resp. Increased propulsive activity in parasitized rats was associated with inflammatory changes and a significant reduction in disaccharidase levels in the gut mucosa. The latter conditions were most marked in the proximal small bowel where the majority of worms resided.

1828 RELATIONSHIP OF CERVICAL AND ABDOMINAL VAGAL ACTIVITY TO LOWER ESOPHAGEAL SPHINCTER FUNCTION. (Eng.) Matarazzo, S. A.; Snape, W. J., Jr.; Ryan, J. P.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 71(6):999-1003; 1976.

The effects of electrical stimulation of the abdominal and cervical portions of the vagus on lower esophageal sphincter (LES) pressure were compared in 30 anesthetized opossums. Unilateral or bilateral abdominal vagotomy gave no significant change in basal LES pressure or in the sphincteric response to swallowing. Electrical stimulation of the peripheral end of the sectioned cervical vagus gave a frequency-related decrease in LES pressure, with a maximum reduction of 93.5 ± 2.5% at 10 Hz, 10 V. Stimulation of the central end of the cervical vagus increased LES pressure, with a maximum response of 34.0 ± 1.9 mm Hg. Neither peripheral nor central stimulation of the sectioned abdominal vagus had significant effect on LES pressure ($p>0.05$). LES relaxation in response to swallowing or cervical vagal stimulation was intact after bilateral abdominal vagotomy. These studies suggest that whereas the cervical portion of the vagus mediates inhibitory and excitatory changes in LES pressure, the abdominal vagus has no role in the control of LES function.

1829 LOWER ESOPHAGEAL SPHINCTER RESPONSE TO ORAL ADMINISTRATION OF CIMETIDINE IN NORMAL SUBJECTS. (Eng.) Freeland, G. R.; Higgs, R. H.; Castell, D. O. (Naval Regional Medical Center, Philadelphia, PA). *Gastroenterology* 72(1):28-30; 1977.

The effect of cimetidine on lower esophageal sphincter (LES) pressure was studied in eight healthy subjects, who received placebo or p.o. doses of cimetidine (50, 100, 200, and 400 mg) in a random, blind manner. Significant serum levels were achieved with all doses of cimetidine (50 mg=0.17 μg/ml, 100 mg=0.33 μg/ml, 200 mg=0.76 μg/ml, and 400 mg=1.61 μg/ml), indicating adequate absorption. Although these serum levels have been found to produce marked inhibition of gastric acid secretion, no discernible effect was found on LES pressure when compared to placebo. Cimetidine does not increase or decrease LES pressure, and is therefore not contraindicated in patients with reflux esophagitis.

1830 EFFECT OF MOTILIN ON THE LOWER OESOPHAGEAL SPHINCTER. (Eng.) Meissner, A. J.; Bowes, K. L.; Zwick, R.; Daniel, E. E. (Dept. Surgery, Inst. Hematology, Warsaw, Poland). *Gut* 17(12):925-932; 1976.

The effect of motilin on lower esophageal sphincter (LES) pressure was studied in unanesthetized dogs by using an infusion manometric technique. Motilin (0.009, 0.012, 0.025, and 0.05 μg/kg) administered as an i.v. bolus, produced statistically significant increases in resting LES pressure ($p<0.02$), which ranged from 35 and 40 cm water at the lowest dose to more than 75 cm at 0.05 μg/kg. Repetitive contractions of the LES appeared at doses as low as 0.009 μg/kg and increased from 12.3 ± 3.12 to 29.6 ± 2.10 contractions/10 min at doses of 0.012 and 0.5 μg/kg, resp. Stomach contractions over this dose range increased from 5.1 ± 1.72 to 17.5 ± 2.01 contractions, resp., over a 10-min period. Atropine (30 μg/kg, i.v.) caused a statistically significant decrease in the resting LES pressure ($p<0.001$); however, despite the administration of atropine, significant increases in LES pressure ($p<0.05$) were observed after the administration of ≥ 0.1 μg/kg motilin, and these increases reached a maximum of about 30 cm. Methacholine bromide (12 μg/kg) had no effect when given after atropine, but produced marked increases in LES pressure in the absence of atropine. After hexamethonium (2 mg/kg, i.v.) administration, the effects of motilin (0.2 μg/kg) on resting LES pressure were reduced, as they were after atropine; however, a slight but significant rise in LES pressure was observed, which reached a maximum of about 80 cm in comparison with a maximum of about 140 cm for motilin only. Hexamethonium (2 mg/kg) and atropine (30 μg/kg) together completely abolished the LES response to motilin. It is concluded that motilin increases LES pressure by acting on preganglionic cholinergic neurons to release acetycholine, which excites other cholinergic neurons supplying the circular muscle of the LES.

1831 LOWER ESOPHAGEAL SPHINCTER PRESSURE AND SERUM MOTILIN LEVELS. (Eng.) Eckardt, V.; Grace, N. D. (Lemuel Shattuck Hosp., 170 Morton St., Boston, MA 12130). *Am. J. Dig. Dis.* 21(12): 1008-1019; 1976.

Experiments were carried out in 13 healthy subjects to examine the effect of gastric alkalinization on lower esophageal sphincter (LES) pressure and serum motilin levels and to investigate a possible correlation between fasting serum motilin levels and LES pressure. During alkalinization by the 20-min intragastric instillation of 0.1 N $NaHCO_3$ the mean LES pressure increased significantly over the basal level, reaching its highest level during the last 5 min of gastric perfusion (31.8 ± 5.7 mm Hg versus 18.7± 2.7 mm Hg basal level, $p<0.01$). Gastric alkalinization did not affect the serum motilin levels. The lack of a correlation between resting sphincter pressure and fasting serum motilin levels supplies further evidence against a physiological role for motilin in the determination of LES strength.

1832 RESPONSES OF THE COMPETENT AND INCOMPETENT LOWER OESOPHAGEAL SPHINCTER TO PENTAGASTRIN AND ABDOMINAL COMPRESSION. (Eng.) Kaye, M. D.; Rein, R.; Johnson, W. P.; Showalter, J. P. (C321 Given Medical Bldg., Univ. Vermont, Coll. Medicine, Burlington, VT 05401). *Gut* 17(12):933-939; 1976.

The effects of continuous i.v. pentagastrin (PEN) infusion (0.45-9.0 μg/kg/hr) and/or intra-abdominal pressure on lower esophageal sphincter (LES) pressure were studied in 10 normal healthy subjects and in 10 patients with reflux esophagitis. Pressures were measured both by sensors stationary within the LES and by repeated withdrawal of the sensors from the stomach to the esophagus. Using the stationary catheter method, significant rises in pressure occurred in the normal subjects at a PEN dose of 0.9 μg/kg/hr; the peak response, which represented a 114% increase over the basal value, occurred at a dose of 4.5 μg/kg/hr PEN. In the patient group, only the 4.5 and 9.0 μg/kg/hr doses had a significant effect on LES pressure; the maximal increase of 62% over the basal value occurred at 9 μg/kg/hr. Using the continuous pullthrough method of pressure measurement, the results were similar; a peak response of 69% occurred in normal subjects at a PEN dose of 4.5 μg/kg/hr, whereas rises in LES pressure in patients, which occurred at PEN doses of 1.8, 4.5, and 9 μg/kg/hr, were not statistically significant. Rises in intragastric pressure during inflation of an abdominal cuff at 15 mm Hg were 4.42 ± 2.09 and 5.33 ± 2.05 mm Hg in controls and patients, resp., when measured by the stationary catheter method, and 3.99 ± 1.80 and 5.70 ± 2.80 mm Hg in controls and patients, resp., when measured by continuous pullthrough. During inflation to 30 mm Hg, stationary catheter pressure measurements were 9.32 ± 3.13 and 9.92 ± 3.60 mm Hg for controls and patients, resp.; the corresponding values measured by the continuous pullthrough method were 8.41 ± 3.15 and 9.84 ± 3.69 mm Hg, resp. The difference between controls and patients was significant ($p<0.02$) at 15 mm Hg when measured by stationary catheter, and was significant at 15 and 30 mm Hg ($p<0.05$) when measured by the continuous pullthrough method. Increases in LES pressure did not significantly exceed increases in intragastric pressure in either patients or normal subjects when measured by either method at all PEN doses used. Hence, there was no evidence of synergism between the effects of PEN and abdominal compression on the LES. It is inferred that gastrin does play a modest role in the physiological regulation of human LES tone. Relative insensitivity of the incompetent LES to PEN is believed to represent sphincteric muscle failure.

1833 DISTRIBUTION OF EXCITATORY VAGAL FIBERS IN CANINE GASTRIC WALL TO CONTROL MOTILITY. (Eng.) Daniel, E. E.; Sarna, S. K. (Dept. Neurosciences, Surgery, and Electrical Engineering, McMaster Univ., Hamilton, Ontario, Canada). *Gastroenterology* 71(4):608-613; 1976.

Patterns of electrical and mechanical responses in the gastric walls of anesthetized dogs to electrical stimulation (5-15 V, 6-20 Hz, 5 msec) of the anterior and posterior branches of the nerve of Latarjet and to local arterial drug perfusions on the two sides were studied. Electrical stimulation of the anterior nerve of Latarjet produced contractile activity on the anterior side, followed rapidly by activity on the posterior side and vice versa, indicating that the axons of the neurons from each side crossed over to the other side. This was not due to the propagation or conduction of electrical response activity, because electrical response activity and contractions induced locally by acetylcholine (0.1-5 μg), injected into a small artery supplying a segment of the stomach, did not propagate. The cross-over innervation and the direct innervation were both segmental in that the response to nerve stimulation dropped out in segments as the branches of the nerves of Latarjet were cut successively. Mainly, preganglionic axons crossed over from the anterior side to the posterior side, but both pre- and postganglionic axons crossed over from the posterior side. This was demonstrated by observing the spread of electrical and mechanical responses, or lack of it, in response to local injection of acetylcholine (2-3 μg) and dimethylpeprazinium (DMPP, 100-1,000 μg). For anterior nerve stimulation, the mean percent reduction in response on the anterior side was 6.8% after local DMPP perfusion on the posterior side and 72.1% after DMPP perfusion on the anterior side; the corresponding reductions in response on the posterior side after DMPP perfusion on the posterior or anterior side were 84.3% and 16.1%, resp. For posterior nerve stimulation, DMPP perfusion on the posterior versus anterior side resulted in reductions in response on the anterior side of 56.5% and 53.6%, resp., and in reductions in response on the posterior side of 72.5 and 8.2%, resp. These results indicate that there is a segmental distribution of excitatory neurons in the gastric wall, which is capable of producing a ring of contraction for controlling gastric emptying and mixing.

1834 TRANSIT TIME CHANGES WITH AGE IN THE GASTROINTESTINAL TRACT OF THE RAT. (Eng.) Varga, F. (Univ. Medical Sch. Pecs, Szigeti u. 12, H-7643 Pecs, Hungary). *Digestion* 14(4):319-324; 1976.

1835 GASTROINTESTINAL MYOELECTRICAL ACTIVITY DURING THE POSTOPERATIVE PERIOD IN MAN. (Eng.) Dauchel, J.; Schang, J. C.; Kachelhoffer, J.; Eloy, R.; Grenier, J. F. (Pavillon chirurgical B, Hospices civils, F-67005 Strasbourg Cedex, France). *Digestion* 14(4):293-303; 1976.

1836 VASCULAR AND GASTROINTESTINAL ACTIONS OF (Gln^4)-NEUROTENSIN IN DOGS [Abstract]. (Eng.) Rosell, S.; Andersson, S.; Chang, D.; Folkers, K. (Karolinska Institutet, S-104 01 Stockholm, Sweden). *Fed. Proc.* 36(3):456; 1977.

1837 THE UPPER ESOPHAGEAL SPHINCTER (UES) IN MAN: SIGNIFICANCE OF RADIAL ASYMMETRY AND PRECISE MEASUREMENT OF CLOSURE STRENGTH [Abstract]. (Eng.) Welch, R. W.; Luckmann, K. (Univ. Texas Health Sciences Center, San Antonio, TX). *Clin. Res.* 25(1):20A; 1977.

1838 NERVE PATHWAYS MEDIATING DISTENSION-INDUCED LOWER ESOPHAGEAL SPHINCTER (LES) RELAXATION IN DOG: DIRECT INTRAMURAL OR CENTRAL [Abstract]? (Eng.) Price, L. M.; Diamant, N. E. (Toronto Western Hosp., Toronto, Ontario, Canada). *Clin. Res.* 25(3):317A; 1977.

1839 THE ROLE OF THE THORACIC VAGUS IN THE CONTROL OF ESOPHAGEAL MOTOR FUNCTION [Abstract]. (Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Dept. Medicine, Hosp. Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 25(3):314A; 1977.

1840 EFFECTS OF ORAL CONTRACEPTIVE AGENTS ON THE LOWER ESOPHAGEAL SPHINCTER (LES) [Abstract]. (Eng.) Fisher, R. S.; Mayer, E.; Grabowski, C. (Dept. Medicine, Temple Univ., Philadelphia, PA). *Clin. Res.* 25(3):310A; 1977.

1841 HUMAN LOWER ESOPHAGEAL SPHINCTER (LES) RESPONSE TO SUBMAXIMAL AND MAXIMAL EFFECTIVE DOSES OF HEPTADECAPEPTIDE GASTRIN I (G-17) IS NOT INHIBITED BY ATROPINE [Abstract]. (Eng.) Jensen, D. M.; McCallum, R. W.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(2):110A; 1977.

1842 EFFECTS OF ENDOGENOUS HYPERGLUCAGONEMIA ON LOWER ESOPHAGEAL SPHINCTER (LES) PRESSURE AND HCl SECRETION [Abstract]. (Eng.) Fisher, R. S.; Tolin, R.; Boden, G. (Dept. Medicine, Temple Univ., Philadelphia, PA). *Clin. Res.* 25(3):310A; 1977.

1843 HISTAMINE RECEPTORS FOR LOWER ESOPHAGEAL SPHINCTER: EVIDENCE FOR H_1 INHIBITORY RECEPTOR [Abstract]. (Eng.) Rattan, S.; Goyal, R. K. (Univ. Texas Health Science Center, Dallas, TX). *Clin. Res.* 25(3):468A; 1977.

1844 MECHANISM OF LOWER ESOPHAGEAL SPHINCTER PRESSURE INCREASES IN RESPONSE TO PENTAGASTRIN INFUSION [Abstract]. (Eng.) Duffy, K.; Ryan, J. P. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Fed. Proc.* 36(3):557; 1977.

1845 SOMATOSTATIN (GHRIH) INHIBITS LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) ELEVATION CAUSED BY GLYCINE [Abstract]. (Eng.) Bybee, D. E.; Brown, F. C.; Georges, L. P.; Castell, D. O.; McGuigan, J. E. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(3):309A; 1977.

1846 EFFECT OF SUBSTANCE P ON THE LOWER ESOPHAGEAL SPHINCTER [Abstract]. (Eng.) Mukhopadhyay, A. K. (Baylor Coll. Medicine, Houston, TX). *Clin. Res.* 25(1):18A; 1977.

1847 TEMPERATURE MODIFICATION OF ESOPHAGEAL MUSCLE CONTRACTION [Abstract]. (Eng.) Beck, B. D.; Brown, F. C.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(1):16A; 1977.

1848 INTESTINAL TRANSIT IN GNOTOBIOTIC CANINES [Abstract]. (Eng.) Heneghan, J. B.; Stevens, N. C. (Louisiana State Univ. Sch. Medicine, New Orleans, LA 70112). *Fed. Proc.* 36(3):455; 1977.

1849 CHANGES IN MYOELECTRICAL ACTIVITY ACROSS A DUODENAL ANASTOMOSIS [Abstract]. (Eng.) Broughton, A. C.; Lord, M. G.; Scott, G. W. (Univ. Hosp., Leeds LS9 7TF, England). *Eur. Surg. Res.* 9(Suppl. 1):157; 1977.

1850 THE EFFECT OF HEAT-LABILE AND HEAT-STABLE Escherichia coli ENTEROTOXIN ON SMALL INTESTINAL MOTILITY [Abstract]. (Eng.) Burns, T. W.; Mathias, J. R.; Carlson, G. M.; Martin, J. L.; Shields, R. P. (Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 25(3):308A; 1977.

1851 THE EFFECT OF TOXIGENIC Escherichia coli AND ITS ENTEROTOXIN ON INTESTINAL SMOOTH MUSCLE [Abstract]. (Eng.) Burns, T. W.; Mathias, J. R.; Carlson, G. M.; Martin, J. L. (Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 25(1):17A; 1977.

1852 THE ELECTRICAL RESPONSE OF VILLOUS AND INTERVILLOUS EPITHELIUM TO GALACTOSE AND THEOPHYLLINE IN AMPHIUMA SMALL INTESTINE [Abstract]. (Eng.) Gunter, P. J.; White, J. F. (Emory Univ., Atlanta, GA 30322). *Fed. Proc.* 36(3):456; 1977.

1853 REGULATORY EFFECT OF ENDOGENOUS PROSTAGLANDIN E IN ISOLATED CAT ILEAL MUSCLE [Abstract]. (Eng.) Sanders, K. M. (UCLA Sch. Medicine, Los Angeles, CA 90024). *Fed. Proc.* 36(3):463; 1977.

1854 NEURAL STIMULATORY ACTIONS OF PURINE ANALOGS IN DOG INTESTINE [Abstract]. (Eng.) Grubb, M. N.; Burks, T. F. (Dept. Pharmacology, Univ. Texas Medical Sch., Houston, TX 77025). *Fed. Proc.* 36(3):1020; 1977.

1855 THE EFFECT OF RICINOLEIC ACID ON SMALL INTESTINAL MOTILITY [Abstract]. (Eng.) Mathias, J. R.; Martin, J. L.; Carlson, G. M.; Burns, T. W. (Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 25(3):314A; 1977.

1856 AN ELECTROPHYSIOLOGICAL STUDY OF THE LUMBAR SYMPATHETIC PATHWAY TO THE COLON OF THE CAT [Abstract]. (Eng.) Krier, J.; de Groat, W. C. (Univ. Pittsburgh, Pittsburgh, PA 15261). *Fed. Proc.* 36(3):463; 1977.

1857 ELECTRICAL POTENTIAL CHANGES AND CONTRACTILE ACTIVITY IN THE COLON OF TURKEYS [Abstract]. (Eng.) Duke, G. E.; Lai, H. C. (College Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55108). *Fed. Proc.* 36(3):463; 1977.

1858 EFFECT OF TROCINATE® ON COLON MOTILITY [Abstract]. (Eng.) Rider, J. A.; Davis, W. M. (Gastrointestinal Res. Lab., Ralph K. Davies Medical Center, San Francisco, CA 94114). *Fed. Proc.* 36(3):1019; 1977.

1859 ELECTROLYTE CONTENT OF COLONIC SMOOTH MUSCLE FROM THE OPOSSUM: POSSIBLE RELATIONSHIP TO FREQUENCY OF ELECTRICAL SLOW WAVES [Abstract]. (Eng.) Schulze, K.; Miller, S.; Christensen, J. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 25(3):469A; 1977.

1860 GASTRIC MOTILITY IN CATS DURING ELECTRICAL VAGAL STIMULATION [Abstract]. (Eng.) Bauer, R. F.; Burrows, C. F.; Kopecky, R.; Brooks, F. P. (Dept. Physiology, Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 24(5):627A; 1976.

1861 GASTRIC EMPTYING OF LIQUIDS IN INTACT DOGS [Abstract]. (Eng.) Strunz, U. T.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(2):112A; 1977.

1862 EFFECT OF HCl, BICARBONATE, ASPIRIN AND PENTAGASTRIN ON GASTRIC MUCOSAL POTENTIAL DIFFERENCE IN RAT [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J. (Veterans Admin. Hosp., Univ. Missouri, Columbia, MO). *Clin. Res.* 25(2):113A; 1977.

1863 ACTION OF GASTRIN ON ANTRAL ELECTRICAL ACTIVITY [Abstract]. (Eng.) Strunz, U. T.; Schlegel, J. F.; Grossman, M. I.; Code, C. F. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(2):112A; 1977.

1864 EFFECT OF GLUCAGON AND PENTAGASTRIN ON GASTRIC MUCOSAL POTENTIAL DIFFERENCE IN MAN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J.; Jeffrey, G. E.; Burks, M. (Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(3):319A; 1977.

MOTILITY

1865 EFFECTS OF E-PROSTAGLANDINS ON CANINE GASTRIC POTENTIAL DIFFERENCE [Abstract]. (Eng.) Callison, D. A.; Dajani, E. Z.; Bertermann, R. E. (Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Fed. Proc.* 36(3):595; 1977.

1866 THE VALVULAR ACTION OF THE CANINE CYSTIC DUCT [Abstract]. (Eng.) Martin, J. S.; Innes, D. L.; Kendall, F. M.; Tansy, M. F. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Fed. Proc.* 36(3):463; 1977.

See also, 1924, 2020, 2021, 2310, 2340, 2588.

SECRETION AND METABOLISM

1867 ACID SECRETORY RESPONSE IN MAN TO 18 INDIVIDUAL AMINO ACIDS [Abstract]. (Eng.) Byrne, W. J.; Christie, D. L.; Ament, M. E.; Walsh, J. H. (UCLA Center Health Sciences, Los Angeles, CA). *Clin. Res.* 25(2):108A; 1977.

1868 STIMULUS-SECRETION COUPLING IN SUBMANDIBULAR GLAND: ROLE OF CYCLIC AMP, CYCLIC GMP AND CALCIUM IN REGULATING ADRENOCEPTOR MEDIATED ENZYME SECRETION. (Eng.) Albano, J.; Bhoola, K. D.; Croker, M.; Heap, P. F.; Lemon, M. J. C. (Medical Sch., Univ. Bristol, Bristol BS8 1TD, England). *J. Physiol.* 254(1):10P-11P; 1976.

1869 ACTION OF NEUROTRANSMITTER SUBSTANCES ON PAROTID AMYLASE SECRETION. (Eng.) Petersen, O. H.; Ueda, N. (Inst. Medical Physiology C, Univ. Copenhagen, Copenhagen, Denmark). *J. Physiol.* 254(1):38P-39P; 1976.

1870 THE EXALTO-MANN-WILLIAMSON ULCER: A REVIEW OF THE LITERATURE. (Eng.) Schapiro, H.; Jackson, N. J. (Eastern Virginia Medical Sch., 358 Mowbray Arch, Box 1980, Norfolk, VA 23507). *Am. J. Dig. Dis.* 21(6):489-495; 1976.

SECRETION AND METABOLISM

Stomach

1871 PROPERTIES OF GASTRIC ANTRUM. III. SELECTIVITY AND MODIFICATION OF SHUNT CONDUCTANCE. (Eng.) Bajaj, S. C.; Spenney, J. G.; Sachs, G. (Lab. Membrane Biology, Univ. Alabama, Birmingham, AL 35294). *Gastroenterology* 72(1):72-77; 1977.

The permselectivity of the paracellular pathway of *Necturus* and bullfrog antrum was investigated with respect to intracationic selectivity and the K^+ and Cl^- permeability ratio as a function of mucosal pH. The intracationic selectivity sequence was $Rb^+ > K^+ > Cs^+ > Li^+$. Both antra showed weak cationic selectivity at pH 7.4, and at pH 4.4 for bullfrog and pH 3.0 for *Necturus*, the ratio P_{K^+}/P_{Cl^-} was unity. At lower mucosal pH, the tissues were anion selective. Treatment of the tissue with a water-soluble carbodiimide enhanced anion selectivity at higher pH; 10 mM carbenoxolone resulted in maintained cation selectivity at lower pH. These data suggest that carboxyl groups play a role in determining shunt selectivity; the increase in anion selectivity below pH 2.0 suggests that phosphat or sulfate groups could also be involved.

1872 LOCALIZATION OF GASTRIC INHIBITORY POLYPEPTIDE RELEASE BY INTESTINAL GLUCOSE PERFUSION IN MAN. (Eng.) Thomas, F. B.; Shook, D. F.; O'Dorisio, T. M.; Cataland, S.; Mekhjian, H. S.;

aldwell, J. H.; Mazzaferri, E. L. (Ohio State Univ. osp., 410 West 10th Ave., Columbus, OH 43210). *astroenterology* 72(1):49-54; 1977.

o determine the site of endogenous release of gas- ric inhibitory polypeptide (GIP), glucose perfusions 556 mM) of duodenum, proximal jejunum, mid-jejunum, nd ileum were performed in 19 human volunteers using n occluding balloon perfusion technique. Preper- usion GIP concentrations were below assay sens- tivity (125 pg/ml) in all subjects. After glucose erfusion, maximal serum GIP concentrations for he four groups were: duodenum, 1,383 ± 152 g/ml; proximal jejunum, 904 ± 87 pg/ml; mid- ejunum, 545 ± 91 pg/ml; and ileum 305 ± 38 pg/ml. ntegrated GIP secretion was significantly greater ith duodenal perfusion (111 ± 21 ng/min/ml) and roximal jejunal perfusion (69 ± 5 ng/min/ml) than ith either mid-jejunal (47 ± 7 ng/min/ml) or ileal 25 ± 6 ng/min/ml) perfusions. Peak serum insulin oncentrations and integrated insulin secretion were lso significantly greater with perfusion of the uodenum or proximal jejunum. Serum glucose concen- rations, integrated serum glucose, and glucose bsorption were similar for the four areas perfused. he results indicate that the proximal small ntestine is the primary site of endogenous GIP elease in man, but that smaller quantities are also eleased by the distal small bowel.

373 RELEASE OF IMMUNOREACTIVE SEROTONIN FOLLOWING ACID PERFUSION OF THE DUODENUM. (Eng.) ellum, J. M., Jr.; Jaffe, B. M. (146th Station Hosp., PO, New York, NY 05055). *Ann. Surg.* 184(5):633-636; 976.

recently developed radioimmunoassay was used o demonstrate the release of serotonin following cidification of the duodenum in dogs. Cannulas ere placed in the portal vein, hepatic vein, and nfrarenal vena cava in eight anesthetized dogs. The uodenum of each dog was irrigated with saline (con- rol) and 0.1 N HCl (50 ml/10 min). Heparinized lood samples were taken from each cannula 5 min efore, and 1, 5, 10, 30, and 60 min after each rrigation, for measurement of immunoreactive sero- onin concentrations. Serotonin concentrations did ot change during saline irrigation of the duodenum. n contrast, serotonin release was consistently ob- erved after duodenal acidification (pH 1.5-2.0). ortal venous serotonin concentrations were increased t 1 min (356 ± 147 ng/ml) and following a biphasic attern remained elevated at 30 and 60 min (499 ± 131 nd 489 ± 187 ng/ml, resp.) Concentrations in the epatic vein rose more slowly and to a lower peak 357 ± 123 ng/ml at 10 min). Caval serotonin concen- rations were increased at 10 min (342 ± 121 ng/ml), ut promptly returned to baseline levels. In the astrointestinal tract, immunoreactive serotonin oncentrations were highest in the duodenal bulb 15.4 µg/g). This study demonstrates that some of the erotonin released after acid perfusion escapes he- atic inactivation. The findings support the possibil- ty that serotonin may be a gastrointestinal hormone nvolved in the feedback inhibition of gastric acid ecretion.

1874 EFFECT OF GASTRIC HYPERSECRETION ON THE CANINE DUODENUM. (Eng.) Henriksen, F. W.; Gammeltoft, M.; Rune, S. J. (Inst. Experimental Res. in Surgery, Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(6):609-614; 1976.

The possibility that chronic gastric hypersecretion injures the duodenal mucosa and thereby reduces the capability of the duodenum to neutralize acid was investigated in dogs. Gastric hypersecretion was produced for 3 weeks in three dogs by the daily injection of a gastrin preparation with a prolonged effect. After an s.c. injection of tetragastrin (1.5 mg), given together with a test meal, the acidity of both gastric and duodenal contents increased significantly, the pH being 2-3 units lower than when the meal was given alone. After the 3 weeks of gastric hypersecretion, the pancreatic bicarbonate response to exogenous secretin was unchanged, while the bicarbonate response to duodenal acidification was decreased from 2.03 mEq/30 min to 1.27 mEq/30 min ($p<0.05$); this was compatible with an impaired secretin release. Also, the concentration of lactase, maltase, sucrase, and alkaline phosphatase in mucosal biopsies from the second part of the duodenum was significantly reduced ($p<0.001$). These results indicate that gastric hypersecretion causes mucosal damage in the duodenum and thereby reduces the release of secretin.

1875 INFLUENCE OF ACID SECRETORY STATE ON THE GASTRIC MUCOSAL TOLERANCE TO BACK DIFFUSION OF H^+. (Eng.) O'Brien, P.; Silen, W. (Dept. Surgery, Harvard Medical Sch., Boston, MA). *Gastroenterology* 71(5):760-765; 1976.

The effects of back diffusion of hydrogen ions (H^+) on the potential difference (PD), electrical resistance (R), and short circuit current (I) of spontaneously secreting and burimamide-inhibited bullfrog gastric mucosae were studied *in vitro*. When back diffusion of H^+ was induced by the passage of 510 µamperes (µA)/cm^2 of electrical current from the secretory side (S; pH 2.25) to the nutrient side (N: pH 7.20) for 30 min, spontaneously secreting mucosae showed significant decreases in PD (-23.6 ± 1.0 to -16.2 ± 2.1 mV, $p<0.005$), and I (80 ± 5 to 61 ± 7 µA/cm^2, $p<0.025$); no significant change occurred in R. When mucosae were inhibited with burimamide (4 mM), significant decreases were seen in PD (-26.8 ± 1.5 to -3.4 ± 1.4 mV, $p<0.001$), I (50 ± 5 to 13 ± 5 µA/cm^2, $p<0.001$), and in R (473 ± 55 to 170 ± 32 ohms/cm^2, $p<0.001$). Stimulation of the mucosae with histamine (4×10^{-4} M) after inhibition by burimamide produced responses to the passage of current that were similar to those observed in spontaneously secreting tissue. When back diffusion of H^+ was induced by establishing a concentration gradient of H^+ from S to N or by exposing the secretory surface to sodium taurocholate (10 mM) with a secretory pH of 2.25, burimamide-inhibited tissue demonstrated significantly greater depressions in PD (-29.8 ± 2.6 to -8.4 ± 3.3 mV, $p<0.001$), R (346 ± 53 to 122 ± 24 ohms/cm^2, $p<0.001$), and in I (71 ± 12 to 25 ± 7 µA/cm^2, $p<0.001$), in comparison with spontaneously secreting tissue, which showed insignificant changes in R and I and a drop in PD from -26.7 ± 1.8 to -17.4 ± 4.4 mV ($p<0.05$). Intracellular pH was significantly higher (7.28 ± 0.02) in spontaneously secreting tissue stimulated by histamine (4×10^{-4} M) than in tissue (7.11 ± 0.03) inhibited by metiamide (2 mM). These results suggest that the secretory status of the mucosa, and hence its acid-base status, are important determinants in the tolerance of the tissue to exogenous back diffusion of H^+. The measure of absolute loss of H^+ from the mucosal solution alone may not be an adequate assessment of the gastric mucosal barrier.

1876 EFFECT OF CHRONIC ANTACID INGESTION ON SERUM GASTRIN AND GASTRIC SECRETION.

(Eng.) Caldwell, J. H.; Cline, C. T.; Fox, A. W.; Cataland, S. (Univ. Hosp., 410 West 10th Ave., Columbus, OH 43210). *Am. J. Dig. Dis.* 21(10):863-866; 1976.

The effects of chronic antacid ingestion on fasting serum gastrin and basal and stimulated acid secretion were investigated in 20 healthy subjects to assess whether antacid therapy of peptic ulcer might account for gastrin cell hyperplasia, altered gastrin inhibition by acid, and gastric hypersecretion. Ten subjects ingested 30 ml of aluminum-magnesium hydroxide suspension 4 times daily for 6 weeks. Ten subjects received the same dose of aluminum-magnesium hydroxide plus calcium carbonate (15 ml) 4 times daily for 6 weeks. All subjects plus five untreated controls were examined before and after treatment. After 6 weeks of antacid therapy, neither group showed significant changes in fasting serum gastrin, basal or maximal histamine-stimulated acid, or acid output in response to a protein meal, when compared with the control group or with their prestudy values. The results suggest that normal subjects do not acquire functional hyperactivity of the gastrin mechanism after a period of regular antacid use.

1877 GASTRIC MUCOSAL LESIONS PRODUCED BY INTRAVENOUS INFUSION OF ASPIRIN IN CATS.

(Eng.) Bugat, R.; Thompson, M. R.; Aures, D.; Grossman, M. I. (Centre Claudius Regard, Toulouse, France). *Gastroenterology* 71(5):754-759; 1976.

The lesions produced by the i.v. infusion of aspirin in cats were characterized, and the question of whether these lesions are accompanied by the changes that are commonly used as an index of a "broken barrier" was investigated. Aspirin (25-200 mg/kg/day) was given by continuous i.v. infusion to 35 intact cats for 7 days. Gastric mucosal lesions occurred in 50-70% of the animals in the various dosage groups, including deep ulcers in 20%. All ulcers were in antral mucosa near its border with the oxyntic mucosa. The incidence of lesions, including ulcers, showed no apparent relation to the dose of aspirin. With all but the highest dose, plasma salicylate levels were within or below what is regarded as the therapeutic range for man. Aspirin (100 mg/kg/day) was given for 7 days to four cats with pouches containing all of the antral mucosa plus some oxyntic mucosa. One or more deep ulcers occurred in the antral mucosa of the pouches in each of these animals. The electrical potential difference across the mucosa did not decrease, and net fluxes of hydrogen ions out of the pouch and of sodium ions into the pouch did not increase during the 7 days of aspirin administration, despite the occurrence of ulcers in the pouches. It is concluded that i.v. aspirin, in doses giving plasma levels within or below the therapeutic range for man, causes gastric mucosal lesions, including deep ulcers within 7 days in cats. These lesions occur without the changes in electrical potential difference or hydrogen and sodium fluxes that are regarded as characteristic of the "broken barrier."

1878 MECHANISM OF PREVENTION OF ASPIRIN-INDUCED GASTRIC LESIONS BY BILE DUCT LIGATION IN THE RAT.

(Eng.) Guth, P. H.; Paulsen, G.; Lynn, D.; Aures, D. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA 90073). *Gastroenterology* 71(5):750-753; 1976.

Studies were carried out in male Sprague-Dawley rats to determine whether bile duct ligation or pylorus ligation inhibits aspirin-induced gastric lesions, and, if so, what the protective mechanisms are. Aspirin (200 mg/kg) was instilled into the stomachs of ether-anesthetized rats 0.5 hr after bile duct ligation or pylorus ligation. Four hours later, the rats were killed, the stomachs were examined, and mucosal lesions were scored. Bile duct ligation, but not pylorus ligation, significantly protected against aspirin-induced gastric lesions. Bile duct ligation in pylorus-ligated rats inhibited gastric acid output by 78%. Instilling HCl plus aspirin in bile duct-ligated rats restored lesion formation. Shunting bile to the colon (to prevent bile reflux) did not prevent aspirin lesions. Salicylate determination to ascertain whether bile duct ligation altered aspirin absorption revealed no significant differences between bile duct ligation and aspirin, shunt and aspirin, and sham shunt and aspirin in plasma and gastric tissue salicylate concentrations. Bile duct ligation protects against aspirin-induced gastric mucosal lesions by inhibiting gastric HCl secretion. As a corollary, a certain amount of acid in the stomach is necessary for aspirin-induced gastric lesions to form. Bile reflux is not necessary for aspirin-induced gastric lesions in the rat.

1879 SALICYLATE- AND ASPIRIN-INDUCED UNCOUPLING OF OXIDATIVE PHOSPHORYLATION IN MITOCHONDRIA ISOLATED FROM THE MUCOSAL MEMBRANE OF THE STOMACH.

(Eng.) Jorgensen, T. G.; Weis-Fogh, U. S.; Nie sen, H. H.; Olesen, H. P. (Gardeniavej 15, DK-2970 Horsholm, Denmark). *Scand. J. Clin. Lab. Invest.* 36(7):649-654; 1976.

The ability of salicylate and acetylsalicylate to induce uncoupling of oxidative phosphorylation in mitochondria isolated from gastric mucosa was tested to evaluate the hypothesis that salicylic acid and its derivatives damage mucosal membranes by disrupting

rocesses dependent upon the rate of oxidative phos-
iorylation, such as mucous and acid secretion and
embrane permeability. Oxidative phosphorylation in
.tochondria from the corpus gland area of miniature
.gs was assayed *in vitro* by: oxygen consumed during
ie phosphorylation of ADP to ATP, the respiratory
ontrol ratio (RCR) or the rate of respiration prior
and following the phosphorylation of ADP, and the
iximum respiratory capacity. Salicylate, applied
concentrations of 0.7-5.6 mM, produced a significant
icrease in the respiratory rate and a corresponding
ecrease in RCR at 0.7 mM, while the phosphate:oxygen
itio was significantly decreased at 1.4 mM. Uncoup-
ing of oxidative phosphorylation was observed at con-
entrations of 3.5-5.6 mM. Statistically equiva-
ent effects were observed in each of these parameters
.th acetylsalicylate, thus proving that salicylic
id and its derivatives are capable of uncoupling
idative phosphorylation *in vitro* in mitochondria
olated from gastric mucosae.

80 EFFECTS OF CARBENOXOLONE ON GASTRIC MUCOSAL PERMEABILITY AND BLOOD FLOW IN THE DOG.

Eng.) Simons, M. A.; Moody, F. G.; Torma, M. J.
Dept. Surgery, Univ. Utah Sch. Medicine, Salt Lake
ity, UT). *Gastroenterology* 71(4):603-607; 1976.

ie effects of carbenoxolone on canine gastric corpus
ere examined at neutral and acidic pH in an attempt
resolve conflicting evidence concerning its influ-
ice upon mucosal permeability and gross ulceration.
ie low solubility of the drug at low pH suggested
iat more consistent and effective concentrations
ight be obtained at a higher pH. Application of
.25% carbenoxolone (pH 7.5-8.0) to the mucosal
irface resulted in a significant drop in the gas-
ric potential difference of 56 ± 2 mV and a large
lux of hydrogen ions out of the lumen. In contrast,
reatment with the drug suspended in 0.15 N HCl
roduced only minimal changes in the potential dif-
erence and hydrogen ion flux. Subsequent exposure
the mucosae treated with either acidified or neu-
ral solutions of carbenoxolone to 20 mM aspirin
roduced an increase in hydrogen ion back-diffusion
imilar to that observed in the control treated with
spirin alone. Replacing a neutral solution of
arbenoxolone by isotonic HCl produced a rise
the blood flow, which was much higher than that
oserved in the control (p<0.05). Topical carben-
olone at neutral pH appears to be effective for
icreasing gastric permeability. However, no appar-
it immediate protection against aspirin was observed.
ie authors suggest that long-term protection by
arbenoxolone against ulcers may derive from in-
reased stimulation of mucous secretion.

81 EFFECT OF CIMETIDINE ON GASTRIC MUCOSAL HISTAMINE AND HISTIDINE DECARBOXYLASE AC-
VITY IN RATS.

(Eng.) Maslinski, S.; Sewing, K. F.;
Dept. Pharmacology, Univ. Tubingen, Tubingen, W. Ger-
igestion 15(2):121-128; 1977.

ie effects of low and high doses of cimetidine, ad-
inistered in the presence and absence of pentagas-
rin, upon histamine concentration in the gastric
icosae and histidine decarboxylase activity were
studied in both conscious and anesthetized gastric fistula rats. A single injection of pentagastrin (250 μg/kg) in conscious rats caused a decrease in the mucosal histamine concentration ($p<0.005$) and an increase in histidine decarboxylase activity ($p<0.001$). Administration of cimetidine (5 mg/kg) in a dose low enough to inhibit gastric secretion in anesthetized rats did not interfere with these effects. A high dose of cimetidine (50 mg/kg) produced the same effects upon histamine concentration and histidine decarboxylase activity as pentagastrin. Apparently, cimetidine can inhibit pentagastrin-stimulated gastric acid secretion without affecting histidine decarboxylase activity. Less pronounced effects of cimetidine on anesthetized rats were observed, except in the presence of high doses of cimetidine, when the stomach was perfused with 0.05 N HCl. HCl significantly elevated both the histamine concentration and the histidine decarboxylase activity. This eliminated the possibility that the stimulatory effect of high doses of cimetidine on histidine decarboxylase activity is caused by endogenous gastrin released in response to increased antral pH, which results from lack of gastric acid secretion. The increased activity may be due to an attempt to override the sustained inhibition of gastric secretion by cimetidine.

1882 EFFECT OF THE HISTAMINE H_2-RECEPTOR ANTAGONIST, CIMETIDINE, ON GASTRIC SECRETION AND SERUM GASTRIN DURING INSULIN INFUSION IN MAN.

(Eng.) Carter, D. C.; Forrest, J. A. H.; Logan, R. A.; Ansell, I.; Lidgard, G.; Heading, R. C.; Shearman, D. J. C. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *Scand. J. Gastroenterol.* 11(6):565-570; 1976.

The effect of cimetidine infusion (100 mg/hr) on the acid secretory response to insulin infusion (0.03 U/kg/hr) was tested in six healthy male volunteers. Although no difference in pepsin secretion or serum gastrin concentration was observed between volunteers and controls, the volume (74.3 ml/hr in treated subjects, 156 ml/hr in controls) and concentration (4.36 versus 17.73 mmol/hr) of acid output were significantly decreased. In an extended test on three subjects, both acid secretion and total pepsin output were significantly reduced. Cimetidine, a nontoxic analog of metiamide, is proposed as a potentially useful agent in treatment of peptic ulcer diathesis.

1883 ADENYLATE CYCLASE OF THE DOG GASTRIC MUCOSA: STIMULATION BY HISTAMINE AND INHIBITION BY METIAMIDE.

(Eng.) Ruoff, H. J.; Sewing, K. F. (Pharmakologisches Institut der Universitat Tubingen, Wilhelmstrasse 56, D-7400 Tubingen, W. Germany). *Naunyn-Schmiedeberg's Arch. Pharmacol.* 294(2):207-208; 1976.

Experiments were carried out to determine whether histamine activates gastric mucosal adenylate cyclase (AC) in the dog, as it does in rodents. The activity of the nonstimulated, basal AC was reduced 27% and 38% by the histamine H_2-receptor antagonist metiamide in concentrations of 10^{-8} M and 10^{-6} M, resp. ($p<0.025$ and $p<0.001$, resp.). The histamine H_1-receptor antagonist mepyramine at the same concentrations had no effect on basal AC activity. Histamine (5 x 10^{-6} M) stimulated basal AC activity by 20% ($p<0.01$). In the presence of 10^{-5} M metiamide, a concentration-dependent stimulation of the enzyme by histamine was observed. The data indicate that endogenous histamine in dog gastric mucosal homogenate contributes at least in part to basal AC activity. This effect is mediated by H_2 excitation.

1884 EFFECT OF PARACETAMOL (ACETAMINOPHEN) ON GASTRIC IONIC FLUXES AND POTENTIAL DIFFERENCE IN MAN. (Eng.) Ivey, K. J.; Settree, P. (Univ. Missouri Medical Center, Columbia, MO 65201). *Gut* 17(11):916-919; 1976.

The effect of large doses of paracetamol (2.0 g) on gastric ionic fluxes was studied in five healthy subjects, and its effect on gastric potential difference was compared with that of 600 mg aspirin. In contrast with salicylates, paracetamol caused no significant alteration in the movement of H+ and Na+ ions over control periods. Aspirin causes a significant fall in transmucosal potential difference (PD) across gastric mucosa of 15 mV, while paracetamol caused no significant change. Four times the recommended dose of paracetamol does not alter gastric ionic fluxes or potential difference. These studies support the choice of paracetamol over aspirin as an analgesic, where damage to gastric mucosa may be critical.

1885 FAILURE OF PENTAGASTRIN ADMINISTRATION TO RESTORE POSTPRANDIAL ACID SECRETION FROM HEIDENHAIN POUCHES AFTER ANTRECTOMY IN DOGS. (Eng.) Keuppens, F.; Bremen, J.; Woussen-Colle, M. C.; De Graef, J. (Dept. Surgery, Free Univ. Brussels, Brussels, Belgium). *Surgery* 80(5):586-590; 1976.

To elucidate the decrease in acid secretory response to feeding from Heidenhain pouches following antrectomy, acid outputs from the Heidenhain pouches of four dogs were measured in response to feeding boiled liver with or without the simultaneous administration of pentagastrin (0.125-16 μg/kg/hr). Antrectomy was performed, and the experiments were repeated. Antrectomy decreased the acid response to feeding by 90%. The pre-antrectomy response was restored by pentagastrin infusion, but near maximal doses were needed, and the maximal response to feeding plus pentagastrin could not be restored. These results indicate that the decrease of the acid secretory response to feeding from Heidenhain pouches after antrectomy cannot be explained fully through suppression of endogenous gastrin release. Antrectomy probably interferes with the intestinal phase of gastric secretion.

1886 INHIBITION OF GASTRIC ACID SECRETION BY SOMATOSTATIN AND ANALOGS IN THE RAT. (Eng.) Lippmann, W.; Borella, L. E. (Biochemical Pharmacology Dept., Ayerst Res. Lab., Montreal, Quebec, Canada). *Pharmacol. Res. Commun.* 8(5):445-454; 1976.

Inhibition of gastric acid secretion by somatostatin and its analogs was studied in unanesthetized male albino rats. Somatostatin (0.6 μM/kg, s.c.) caused a marked decrease in gastric acid output from 50-60 μEq/min to about 10-20 μEq/15 min for 60 min, with the output rate returning to the basal rate in a subsequent 30-min period. The overall duration of the inhibitory effect increased from 77 min at a dose of 0.6 μM/kg to 133 min at a dose of 2.0 μM/kg. The degree of inhibition of total acid output was 75 ± 3% for each dose. (Descarboxy^{14})-somatostatin and (desamino^{1})(descarboxy^{14})-somatostatin (0.6 μM/kg, s.c.) were less effective, with the inhibition of total acid output being 67 ± 3 and 62 ± 5%, resp., and the durations of the inhibitory effect being 38 ± 8 and 34 ± 3 min, resp. (Desamino^{1})-somatostatin (0.6 μM/kg, s.c.) was similar in activity to somatostatin and inhibited total acid output by 73 ± 4%, with the duration of inhibition being 87 ± 14 min. (D-lysine^{9})-somatostatin was not appreciably effective in inhibiting gastric acid secretion, even at a dose of 2 μM/kg (25% inhibition). Atropine (0.014 μM/kg, s.c.) was similar in activity to somatostatin and inhibited gastric acid output by 69 ± 5%, with the inhibition duration being 73 ± 8 min. In each of these cases, the onset of the inhibiting effect occurred 15 min after drug injection. Gastric acid output stimulation was induced by two consecutive equal doses of pentagastrin (50 μg/kg/hr, i.v. for 45 min) spaced 3-4 hr apart, with the values of gastric secretion after these two doses being 592 ± 94 and 882 ± 101 μEq, resp. However, somatostatin (0.05 μM/kg) caused maximal inhibition (86 ± 9%) of the induced secretion and the basal secretion (30 ± 10%). Thus, somatostatin and various analogs inhibit basal gastric acid secretion in the unanesthetized rats, and pentagastrin-induced gastric acid secretion is antagonized by somatostatin.

1887 MAJOR GLYCOLIPID OF HUMAN GASTRIC CONTENT [Abstract]. (Eng.) Slomiany, B. L.; Slomiany, A.; Glass, G. B. J. (New York Medical Coll., New York, NY 10029). *Fed. Proc.* 36(3):456; 1977.

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Abstract]. (Eng.) DeSchryver-Kecskemeti, K.;
reider, M. H. (Washington Univ., St. Louis, MO
3110). *Fed. Proc.* 35(3):217; 1976.

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ergegardh, S.; Olbe, L. (No affiliation given).
cta Hepatogastroenterol. (Stuttg.) 22(6):423-424;
975.

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REPARATION: EFFECT OF SECRETAGOGUES AND INHIBITORS.
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oyama Univ., Toyama 930, Japan). *Jpn. J. Pharmacol.*
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TOMACH [Abstract]. (Eng.) Ray, T. K. (Univ.
exas Medical Sch., Houston, TX 77025). *Fed.*
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895 HORMONAL REGULATION OF GASTRIC MUCOSAL POTENTIAL DIFFERENCE: RELATION TO GAS-
RIC MUCOSAL INTEGRITY [Abstract]. (Eng.) Ivey,
. J.; Tarnawski, A. (Veterans Admin. Hosp., Columbia,
0). *Clin. Res.* 25(3):468A; 1977.

896 EFFECT OF HYPOTHALAMIC LESIONS ON GASTRIC ACID SECRETION IN CATS [Abstract].
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os Angeles, CA 90024). *Fed. Proc.* 36(3):594; 1977.

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ibson, R. G.; Hirschowitz, B. I. (Div. Gastro-
nterology, Univ. Alabama, Birmingham, AL). *Clin.*
es. 25(1):50A; 1977.

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OSAL BLOOD FLOW IN DOGS [Abstract]. (Eng.)
onturek, S. J.; Wunsch, E. (Inst. Physiology,
rakow, Poland). *Acta Hepatogastroenterol. (Stuttg.)*
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arrick, M. W.; Lin, T. M. (Lilly Res. Lab., In-
lianapolis, IN 46206). *Fed. Proc.* 35(3):218; 1976.

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See also, 1772, 1862, 1863, 1881, 1948, 2108, 2145
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SECRETION AND METABOLISM

Pancreas

1926 MICROPUNCTURE STUDY OF PANCREATIC SECRETION IN THE CAT. (Eng.) Lightwood, R.; Reber, H. A. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(1):61-66; 1977.

An *in vivo* model for micropuncture of the cat pancreas and data regarding the sites of water and electrolyte secretion in this preparation are presented. Fifty female mongrel cats were used. During maximal secretin stimulation (4-6 U/kg/hr), juice was collected from intralobular (10-50 μ diameter) and extralobular (25-300 μ diameter) ducts by micropuncture and compared with juice simultaneously collected from the main duct. The juice (Cl^-) steadily decreased from intralobular ducts (112 ± 9 mEq/l) to the main duct (46 ± 8 mEq/l). During *in vivo* perfusion, secretion of H_2O and HCO_3^- by the extralobular ducts (25-150 μ diameter) was sensitive to secretin. There was no evidence for secretion by the main duct. Pancreatic secretion of water and electrolytes appears to result from the admixture of a Cl-rich primary secretion originating from intralobular structures and a larger volume of HCO_3^--rich fluid originating from the smaller extralobular ducts. HCO_3^--Cl^- exchange in these ducts accounts for the characteristic changes in concentrations of HCO_3^- and Cl^- as the flow rate varies.

1927 DISTRIBUTION AND RELEASE OF HUMAN PANCREATIC POLYPEPTIDE. (Eng.) Adrian, T. E.; Bloom, S. R.; Bryant, M. G.; Polak, J. M.; Heitz, P.; Barnes, A. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 17(12):940-944; 1976.

The distribution and release of human pancreatic polypeptide (HPP) were studied using a radioimmunoassay, which utilized antisera against HPP produced in rabbits. HPP distribution in the alimentary tract was investigated in three adult baboons and two monkeys that had been maintained in a human diet for several yr. Approximately 93% of the total pancreatic polypeptide (PP) in the gut was found in the pancreas. Small amounts of PP immunoreactivity were found throughout the intestinal tract, from the esophagus to the colon. An investigation of human apudomas (insulinomas, glucagonomas, gastrinomas, and VIPomas) revealed that the mean tumor PP content of neoplasms containing PP cells was 2,600 pM/g, as compared with 390 pM/g for normal human pancreas. The immunoreactive PP from these tumors and from normal pancreas was chromatographically indistinguishable from the pure peptide. The plasma concentration of PP in positive tumor cases was greater than 300 pM, as compared with a normal range of 2-90 pM. The mean fasting plasma HPP level of 25 normal subjects was 31.2 ± 6.2 pM; after a normal hospital lunch, the 30-min peak in postprandial plasma HPP was 164 ± 46.2 pM, and the plasma PP level 6 hr after the meal was still raised at 80.1 ± 26.6 pM. In fasting plasma from patients who had undergone total pancreatectomy, PP was undetectable (<6 pM). Since fasting plasma PP levels in patients with pancreatic endocrine tumors containing PP are higher than even the postprandial level in normal subjects, PP measurement is a useful diagnostic tool for cases of pancreatic endocrine tumors.

1928 MECHANISM OF PANCREATIC POLYPEPTIDE RELEASE IN MAN. (Eng.) Adrian, T. E.; Besterman, H. S.; Cooke, T. J. C.; Bloom, S. R.; Barnes, A. J.; Russell, R. C. G.; Faber, R. G. (Hammersmith Hosp., London W12 OHS, England). *Lancet* 1(8004):161-163; 1977.

To study the mechanism of pancreatic polypeptide (PP) release, the effects of vagotomy, hormone infusion, and i.v. nutrition were investigated. After a standard hospital lunch, the plasma PP concentration showed a rapid and identical rise in 10 healthy controls, 11 duodenal ulcer patients, and 6 postvagotomy patients, but remained undetectable in 4 totally pancreatectomized subjects. The plasma PP level was unaffected by the i.v. administration of glucose (20 g as 50% solution), amino acids (25 g), or fat (8 g). However, during the i.v. infusion of cerulein (100 ng/kg/hr, 40 min), the PP rose by nearly fivefold, and the injection of secretin (2 Crick-Harper-Raper U/kg, i.v.) produced an even greater rise (from 18 ± 3 pM to 264 ± 86 pM). In 19 duodenal ulcer patients, insulin hypoglycemia produced a rapid increase in plasma PP, but this did not occur in any of the 17 patients studied after truncal vagotomy. The results suggest that PP is released by p.o., but not i.v., nutrients, and the existence of an entero-PP axis is postulated. One component of this axis may be the vagal innervation, but the normal postprandial rise seen after vagotomy suggests that other control mechanisms, such as the intestinal hormones, are more important.

1929 QUANTITATION OF ACTIVE PANCREATIC ENDOPEPTIDASES IN THE INTESTINAL CONTENTS OF GERM-FREE AND CONVENTIONAL RATS. (Eng.) Genell, S.; Gustafsson, B. E.; Ohlsson, K. (Malmo General Hosp., S-21401 Malmo, Sweden). *Scand. J. Clin. Lab. Invest.* 36(6):757-762; 1976.

Trypsin, chymotrypsin, and elastase were measured in the intestinal contents of germ-free and conventional laboratory rats (Swedish AGUS strain). Concentrations of active trypsin were highest in the lower half of the small intestine in both germ-free and conventional rats, with the values being about 400 and 600 μg/g, resp. Activity fell abruptly in the cecal contents and was about 100 μg/g for both germ-free and conventional rats. Most striking was the relatively high amount of active trypsin in the feces of germ-free rats (over 100 μg/g), as compared with a negligible amount in the feces of conventional rats. Both types of rats showed about 200 μg/g of active trypsin in the upper small intestinal contents. Active chymotrypsin was easily demonstrable in the small intestine, but occurred only in very low concentrations in the cecal contents and feces; no certain differences existed between upper and lower small intestinal contents or between germ-free and conventional rats. Concentrations of active elastase were highest in the upper half of the small intestine in both germ-free and conventional rats, with the values being about 1,300 μg/g for germ-free rats and about 800 μg/g for conventional rats. Active elastase was also present in the cecal contents (about 150 μg/g) and feces (about 200 μg/g) of germ-free rats, but not in those of conventional rats. These results suggest that normal microbiological inhabitants of the intestinal tract of rats play a role in the inactivation of pancreatic enzymes.

1930 REQUIREMENTS FOR ACTIVATION OF TRYPSINOGEN AND CHYMOTRYPSINOGEN IN RABBIT PANCREATIC JUICE. (Eng.) Glazer, G.; Steer, M. L. (St. Mary's Hosp., Praed St., London W2, England). *Anal. Biochem.* 77(1):130-140; 1977.

Requirements for the activation of trypsinogen and chymotrypsinogen were studied in rabbit pancreatic juice. Trypsinogen was optimally activated by purified enterokinase at 30 C after 2 hr in the presence of 25 mM Tris-HCl (pH 8.1) containing 25 mM $CaCl_2$. Chymotrypsinogen was optimally activated by trypsin at 4 C after 2 hr in the presence of 50 mM Tris-HCl (pH 8.1). Bovine serum albumin was added to the activation mixtures to prevent loss of zymogens through adsorption to the container walls. The activation of trypsinogen by purified enterokinase varied with temperature, time, Ca^{2+} concentration, and enterokinase concentration; it was unchanged over the pH range of 7.4-8.8. Activation of chymotrypsinogen by trypsin was found to vary with temperature, time, and trypsin concentration, but was not altered by the presence or absence of Ca^{2+} and was unchanged over the same pH range. Using optimal conditions for zymogen activation, the eventual proteolytic activity and the amount of juice protein being activated were found to be directly related. Deviations from these conditions of activation could lead to erroneous results.

1931 CHRONIC ALCOHOLISM AND CANINE EXOCRINE PANCREAS SECRETION: A LONG TERM FOLLOW-UP STUDY. (Eng.) Sarles, H.; Tiscornia, O. M.; Palasciano, G. (Unite de Recherches de Pathologie Digestive, INSERM U-31, 46 chemin de la Gaye, 13009 Marseille, France). *Gastroenterology* 72(2):238-243; 1977.

Sequential changes in pancreatic secretion were evaluated during a 2- to 3-yr follow-up study in eight dogs provided with Thomas gastric and duodenal fistulas. Four animals received intragastric ethanol (2 g/kg) daily for 3 yr; four others served as controls. In alcohol-fed animals, flow rate and bicarbonate output in response to 1 clinical U/kg/hr of secretin were increased at the end of 2 yr, but not after 1 yr of alcohol feeding. At the end of 2 yr, the dose-response curve of pancreatic secretion to cholecystokinin was unchanged, but the maximal bicarbonate and water secretion in response to high doses of secretin was increased. These modifications may be explained by reduplication of pancreatic ducts secondary to the development of chronic pancreatitis, which was verified by biopsy. The previous report of an increased cholecystokinin release in the course of chronic alcohol consumption in dogs seems to be attributable to an artifact. The present study showed that the pancreatic response to intraduodenal oleic acid was not significantly modified by 3 yr of alcohol feeding.

1932 SHORT DATED INFLUENCE OF TEMOVAL [sic] OF THE EXOCRINE PANCREATIC SECRETION (ENZYMATIC OR TOTAL) UPON THE APPARENT DIGESTIBILITY OF A DIET, IN THE PIG [Abstract]. (Eng.) Corring, T.; Bourdon, D. (INRA, 78350 Jouy en Josas, France) *Scand. J. Gastroenterol.* 11(41):80; 1976.

1933 STUDIES ON THE MECHANISM OF BICARBONATE SECRETION IN THE ISOLATED PERFUSED PANCREAS OF THE CAT [Abstract]. (Eng.) Hotz, J.; Hadi, N.; Wynne, R. D. A.; Scratcherd, T. (Med. Klinik, Abtl. Gastroenterol., Univ. Essen, Essen, W. Germany). *Scand. J. Gastroenterol.* 11(41):83; 1976.

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1936 NON PARALLELISM INDUCED IN THE PANCREATIC ENZYME SECRETION OF MAN BY A SECRETORY STIMULATION [Abstract]. (Eng.) Dagorn, J. C.; Sahel, J.; Michel, R.; Nicolas, R.; Figarella, C.; Sarles, H. (INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(41):72; 1976.

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1938 KINETICS OF STIMULUS-SECRETION COUPLING IN PANCREATIC ACINAR CELLS [Abstract]. (Eng.) Peikin, S. R.; Gardner, J. D. (Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 25(3):316A; 197

1939 PANCREATIC BICARBONATE AND PLASMA SECRET RESPONSES TO MEALS VARYING IN pH [Abstra (Eng.) Konturek, S. J.; Thompson, J. C. (Inst.

Physiology, Krakow, Poland). *Scand. J. Gastroenterol.* 11(41):16; 1976.

1940 EFFECTS OF TOTAL PARENTERAL FEEDING ON PANCREATIC BICARBONATE SECRETION IN THE DOG [Abstract]. (Eng.) Schanbacher, L. M.; Copeland, E. M.; Johnson, L. R. (Univ. Texas Medical Sch. at Houston, Houston TX). *Clin. Res.* 24(1):13A; 1976.

1941 ELUCIDATION OF THE BIOCHEMICAL BASIS OF ACTION OF CHOLECYSTOKININ [Abstract]. (Eng.) Conlon, T. P.; Christophe, J.; Shelby, H. T.; Fransden, E. K.; Gardner, J. D. (Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 24(3):432A; 1976.

1942 EVIDENCE FOR AN ANTI-CCK-PZ FACTOR IN THE RAT: DELAYED INHIBITION OF PROTEIN SECRETION AFTER INTRADUODENAL OLEIC ACID INFUSION [Abstract]. (Eng.) Laugier, R.; Sarles, H.; Bourry, J.; Bretholz, A.; Voirol, M. (INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(41):22; 1976.

1943 FOETAL AND POSTNATAL SENSITIVITY OF RAT PANCREATIC ACINI TO CHOLINERGIC STIMULATION: EFFECT OF CORTICOSTERONE [Abstract]. (Eng.) Larose, L.; Morisset, J. (G. I. Res. Unit, Sherbrooke Univ., Sherbrooke, Quebec, Canada JIK 2R1). *Fed. Proc.* 35(3):540; 1976.

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1945 ACTIVITY OF C-TERMINAL PARTIAL SEQUENCES OF SECRETIN [Abstract]. (Eng.) Bitar, K. N.; Zfass, A. M.; Bodaszky, M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Clin. Res.* 25(3):307A; 1977.

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1947 CYCLIC-AMP TISSUE LEVELS IN RAT PANCREAS AFTER DOPAMINE COMPARISON WITH THE RESPONSE TO SECRETIN [Abstract]. (Eng.) Brenac, B.; Vaysse, N.; Pascal, J. P.; Moatti, J. P.; Ribet, A. (INSERM U-51, CHU Rangueil, L. 3 Toulouse, France). *Scand. J. Gastroenterol.* 11(41):79; 1976.

1948 DOPAMINE STIMULATES PANCREATIC SECRETION AND INHIBITS GASTRIC SECRETION IN DOGS [Abstract]. (Eng.) Valenzuela, J. E.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 24(3):292; 1976.

1949 INHIBITION OF SECRETIN RELEASE AND PANCREATIC BICARBONATE SECRETION AFTER DUODENAL ACIDIFICATION BY SOMATOSTATIN INFUSION IN MAN [Abstract]. (Eng.) Hanssen, L. E.; Hanssen, K. F.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(41):15; 1976.

1950 VASOACTIVE INTESTINAL PEPTIDE: A SECRETIN-LIKE PARTIAL AGONIST OF HUMAN PANCREATIC SECRETION [Abstract]. (Eng.) Domschke, S.; Domschke, W.; Rosch, W.; Konturek, S. J.; Wunsch, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Scand. J. Gastroenterol.* 11(41):21; 1976.

1951 ELECTROLYTE SECRETION OF A PANCREATIC DUCT MODEL IN THE RAT [Abstract]. (Eng.) Folsch, U. R.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Digestion* 13(1/2):110; 1975.

1952 PANCREATIC ACINAR CELLS: A BIOCHEMICAL STUDY OF MOVEMENT OF ZYMOGEN GRANULES ON STIMULATION WITH BETHANECHOL CHLORIDE [Abstract]. (Eng.) Singh, M. (Veterans Admin. Hosp., Augusta, GA). *Clin. Res.* 25(3):318A; 1977.

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1955 PANCREATIC AND INTESTINAL ENZYME LEVELS IN THE CHENODEOXYCHOLIC ACID FED MOUSE [Abstract]. (Eng.) O'Donnel, M. D.; FitzGerald, O.; McGeeney, K. F. (Dept. Medicine and Therapeutics, Univ. Coll. Dublin 4, Ireland). *Scand. J. Gastroenterol.* 11(41):65; 1976.

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1957 THE EFFECT OF CHRONIC INTRAGASTRIC ETHANOL ON PANCREATIC RESPONSE TO CENTRAL VAGAL STIMULATION BY 2 DEOXY D GLUCOSE IN THE RAT [Abstract]. (Eng.) Chariot, J.; Roze, C.; Souchard, M.; Vaille, C.; Debray, C. (Hopital Bichat, 170 Bd Ney, 75877 Paris Cedex 18, France). *Scand. J. Gastroenterol.* 11(41):71; 1976.

1958 PANCREATIC ACINAR CELLS: EFFECT OF IONOPHORES ON AMYLASE SECRETION AND EFFLUX OF ^{45}Ca [Abstract]. (Eng.) Singh, M. (Medical Coll. of Georgia, Augusta, GA 30904). *Fed. Proc.* 35(3):540; 1976.

1959 HUMAN CARBOXYPEPTIDASE B. II. PURIFICATION OF THE ENZYME FROM PANCREATIC TISSUE AND COMPARISON WITH THE TWO FRACTIONS PRESENT IN PANCREATIC SECRETION [Abstract]. (Eng.) Geokas, M. C.; Brodrick, J. W.; Largman, C. (Martinez Veterans Admin. Hosp., Martinez, CA). *Clin. Res.* 24(3):284A; 1976.

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1961 THE ROLE OF PROTEIN KINASE IN SECRETION BY THE RAT EXOCRINE PANCREAS [Abstract]. (Eng.) Lewis, D. S.; Ronzio, R. A. (Dept. Biochemistry, Michigan State Univ., East Lansing, MI 48824). *Fed. Proc.* 36(3):690; 1977.

1962 INHIBITORY ACTION OF MORPHINE ON THE PANCREAS: ITS SIMILARITY TO THE ACTION OF ACETALDEHYDE [Abstract]. (Eng.) Fitzpatrick, J. M.; FitzGerald, O.; FitzGerald, P.; McGeeney, K. F. (Dept. Surgery, Univ. Coll., Dublin, Ireland). *Scand. J. Gastroenterol.* 11(41):66; 1976.

1963 EFFECT OF TRYPSIN AND SODIUM TAUROCHOLATE ON PANCREATIC PROTEIN SECRETION IN RATS [Abstract]. (Eng.) Green, G. M. (Children's Hosp. Medical Center, Oakland, CA 94609). *Fed. Proc.* 35(3):540; 1976.

1964 MECHANISM OF ACTIVATION AND ENZYMATIC PROPERTIES OF THE TWO HUMAN TRYPSINOGENS AND OF THEIR TWO DERIVED TRYPSINS [Abstract]. (Eng.) Colomb, E.; Michel, R.; Guy, O.; Figarella, C. (INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(41):54; 1976.

See also, 1747, 1756, 1757, 1758, 1759, 1922, 2160, 2287, 2308, 2357, 2418.

SECRETION AND METABOLISM

Hepatobiliary Tract

1965 THE ROLE OF CHOLECYSTOKININ IN RADIOGRAPHIC OPACIFICATION OF THE GALLBLADDER. (Eng.) Herzog, R. J.; Nelson, J. A. (Univ. California Sch. Medicine, San Francisco, CA). *Invest. Radiol.* 11(5):440-448; 1976.

The effect of cholecystokinin (CCK) on hepatic elimination of i.v. iopanoate and on gallbladder opacification was studied in nonoperated dogs with intact enterohepatic circulation and normal endogenous bile salt pool. The i.v. administration of CCK (3 U/kg) resulted in a 32% increase in apparent transport maximum (maximum rate of elimination) or iopanoate and earlier and enhanced gallbladder opacification. This increase in apparent transport maximum was abolished by cholecystectomy, indicating that the increase was a result of the release of bile salts from the gallbladder rather than a direct effect of the hormone on the hepatic elimination of iopanoate. The early gallbladder opacification and increased density of contrast material in the gallbladder were related to CCK-induced emptying of the gallbladder and subsequent filling with opacified bile.

1966 INFLUENCE OF RETROGRADE VOLUME AND SHORT TIME CHOLESTASIS ON THE BILIARY REABSORPTION OF SULFOBROMOPHTHALEIN SODIUM (BSP) AND PHENOL 3, 6 DIBROMPHTHALEIN DISULFONATE (DBSP) FROM THE RA BILIARY TREE AFTER RETROGRADE INTRABILIARY INJECTI (RII). (Eng.) Dammann, H. G.; Essen, J. (Medizinische Klinik der Universitat Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Res. Exp. Med. (Berl.)* 168(3):187-198; 1976.

The reabsorption of equimolar doses (1.2 µmol) of BSP and its analogue phenol 3,6-dibromphthalein disulfonate (DBSP) from the rat biliary tree was determined using the retrograde intrabiliary injec tion (RII) technique, and the influence of retrograde volume and short-time cholestasis on reabsorption was studied. RII was performed with a microliter syringe joined to a cannula positioned in the proximal third of the common bile duct. This technique guaranteed accurate administration of the volumes; also, free bile flow could be reinitiated 3-5 sec after RII. Bile samples were collected in 2.5-min intervals up to the fifth minute, in 5-min intervals up to 15 min, and at 30 min. No significant differences in the biliary reabsorption of BSP and DBSP after RII were detected. Increasing the retrograde volume from 20 to 40, 60, 110, and 160 µl led to decreased percentage recoveries in the bile in the first 2.5 min (88.0 ± 3.8-15.6 ± 3.1%), when bile flow was started immediately after RII. Increasing the duration of cholestasis (bile flow was started immediately, 0.5 min, 3 min, 6 min, and 30 min after RII) resulted in decreased percentage recoveries of BSP and DBSP during the first 2.5 min after free bile flow was reinitiated (52.7 ± 3.6-20.0 ± 1.2%). The amount of biliary BSP conjugate increased concommitantly with the duration of cholestasis, indicating that ductular-hepatocellular circulation continues even during complete common bile duct obstruction.

1967 THE DYNAMICS OF α-FETOPROTEIN AND ALBUMIN SYNTHESIS IN HUMAN AND RAT LIVER DURING NORMAL ONTOGENY. (Eng.) Nayak, N. C.; Mital, I. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi 110016, India). *Am. J. Pathol.* 86(2):359-371; 1977.

The dynamics of synthesis of α-fetoprotein (AFP) and albumin were studied in Sprague-Dawley rats and man by immunocytochemical localization of each protein in the liver and by its quantitation in serum at differen periods of normal intrauterine and extrauterine life. The proteins were present only in the cytoplasm of hepatocytes. During physiologic development, an inverse relationship existed between the serum concentrations of the two proteins; the serum concentration for each appeared to be directly related to the number of hepatocytes synthesizing it. AFP-containing cells were randomly distributed, while albumin-containing cells were more uniformly arranged. Both, however, were often preferentially located around venous channels. The last AFP-containing cells to disappear with advancing postnatal age were around the hepatic veins. When both proteins were present in serum, several hepatocytes appeared to synthesize the two simultaneously, although other hepatocytes contained only one protein. It is unlikely that in the physiologic state different populations of hepatocytes are assigned to synthesize AFP and albumin separately.

1968 METABOLISM OF STEROID AND AMINO ACID MOIETIES OF CONJUGATED BILE ACIDS IN MAN. V. EQUATIONS FOR THE PERTURBED ENTEROHEPATIC CIRCULATION AND THEIR APPLICATION. (Eng.) Hoffman, N. E.; Hofmann, A. F. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 72(1):141-148; 1977.

Equations previously developed to describe the enterohepatic circulation of the major biliary bile acids in man were modified to predict the effect of prototypic perturbations of the enterohepatic circulation on biliary bile acid composition and the pattern of amino acid conjugation. For the steroid moiety, the effects of bile acid feeding, increased recycling frequency, decreased intestinal conservation, and increased dehydroxylation were simulated. These simulations indicated that the size of the exchangeable bile acid pool for any circulating bile acid (steroid moiety) is related to the balance between input (from hepatic or bacterial formation) and intestinal loss. For the amino acid moiety (glycine or taurine), the effect of increased deconjugation or preferential loss of one of the amino acid moieties was simulated. These simulations indicated that the amino acid composition of biliary bile acids does not necessarily reflect the proportion of amino acids used for conjugation (input), but rather the balance between input and loss. Because the above variables may vary widely and independently, analysis of biliary bile acid composition in terms of the steroid moiety or the glycine-taurine ratio *per se* cannot be used to infer the relative rates of input or conjugation.

1969 METABOLISM OF CHENODEOXYCHOLIC ACID IN HAMSTERS. (Eng.) Tateyama, T.; Katayama, K. (Dept. Drug Metabolism, Eisai Co., Ltd., Koishikawa, Bunkyo-ku, Tokyo 112, Japan). *Lipids* 11(12):845-847; 1976.

The metabolites of chenodeoxycholic acid (CDCA) were determined in the bile and feces of male Golden hamsters after the p.o. administration of [^{14}C]CDCA (1 mg/kg). The radioactive bile acids were analyzed by thin layer chromatography and identified by the isotope dilution method. Twenty-four hours after radioactive CDCA administration, most of the radioactivity obtained from the gallbladders of bile fistula animals was unchanged CDCA (75.9-85.2%); the most predominant CDCA metabolite in the bile was 7-ketolithocholic acid (8.0-10.0%), followed by an unknown fraction 2 (1.1-5.2%), and lithocholic acid (0.5-0.9%). In the feces obtained 1 week after CDCA administration, lithocholic acid was the most predominant CDCA metabolite (53.1-68.2%), and unchanged CDCA comprised only 3.3-7.1% of the total radioactivity. Dehydrolithocholic acid and isolithocholic acid comprised 2.1-3.7% and 5.2-8.9% of the total radioactivity, resp. After the multiple dosing of [^{14}C]CDCD for 6 days, β-muricholic acid was identified in both the bile and the feces.

1970 EFFECT OF SULFATE AND NON-SULFATED GASTRIN AND OCTAPEPTIDE-CHOLECYSTOKININ ON CAT GALL BLADDER IN VITRO. (Eng.) Chowdhury, J. R.; Berkowitz, J. M.; Praissman, M.; Fara, J. W. (Albert Einstein Coll. Medicine, Bronx, NY). *Experientia* 32(9):1173-1175; 1976.

The isomeric tension responses to sulfated (G-17-S) and nonsulfated (G-17-NS) porcine gastrin and sulfated (OP-S) and nonsulfated (OP-NS) synthetic C-terminal octapeptide of cholecystokinin (CCK) were compared in strips of cat gallbladder. The maximal response to each hormone and the dose required to produce half the maximal response (D_{50}) were obtained both by direct observation and by linear transformation of Michaelis-Menten constants. There was no significant difference between the maximal isomeric tension responses obtained with OP-S and OP-NS. There were no significant differences in maximal responses obtained with G-17-S, G-17-NS, and nonsulfated synthetic human gastrin I (HSG-NS); the maximal response obtained with each of the three gastrins averaged 70% of that obtained with OP-S. When the respective D_{50}'s were compared, OP-S was nearly 1,000 times more potent than OP-NS, while G-17-S was about 10 times more potent than G-17-NS and HSG-NS. The large difference in potency observed between OP-S and OP-NS is consistent with effects reported in *in vitro* guinea pig gallbladder and on rat pancreatic secretion, and emphasizes the importance of sulfation of the seventh position tyrosine.

1971 ENZYME HISTOCHEMICAL STUDY ON FAT-STORING CELLS (SO-CALLED ITO'S CELL) OF LIVER.

(Eng.) Tanaka, M.; Kosakai, M.; Inomata, I.; Takaki, K.; Ishikawa, E. (Jikei Univ. Sch. Medicine, Japan). *Acta pathol. Jpn.* 26(5):581-588; 1976.

Fat-storing cells of normal and abnormal human liver were histochemically studied. Fat-storing cells in fresh frozen sections of normal human liver, which were fixed for 2 min in 70% cold ethanol, incubated, and then fixed in 1% osmium tetroxide, showed no alkaline phosphatase, acid phosphatase, or esterase activity. They did demonstrate a marked γ-glutamyl transpeptidase activity similar to that observed in fibroblast-like cells or in fibers of fibrotic areas of the liver, suggesting the possibility of the enzyme's participation in fiber protein synthesis. This possibility is further strengthened by the fact that fibroblast-like cells, which are morphologically similar to fat-storing cells, are found in the fibrotic area of liver parenchyma. Whereas under normal conditions, fat-storing cells participate in the formation of fibers supporting the sinusoidal wall, under abnormal conditions (chronic hepatitis), they gradually change their shape with the loss of fat droplets and are transformed into fibroblast-like cells.

1972 EFFECTS OF ACETOXYCYCLOHEXIMIDE ON THE METABOLISM OF HEPATIC TRIGLYCERIDES IN THE RAT.

(Eng.) Sabesin, S. M. (Univ. Tennessee Coll. Medicine, Memphis, TN 38163). *Exp. Mol. Pathol.* 25(2):227-235; 1976.

The effect of acetoxycycloheximide (ACH) on hepatic triglyceride metabolism in albino Sprague-Dawley rats was investigated. In rats fasted overnight who were given an i.p. injection of ACH (0.25 mg/kg) at 0 hr followed by a second dose at 3 hr, the hepatic triglycerides (HTG) ranged from 4.9 ± 1.3 mg/g at 1.5 hr after ACH to 8.2 ± 1.4 mg/g at 24 hr after ACH, compared to a control value of 4.5 ± 1.6 mg/g. Plasma triglycerides (PTG) in these rats ranged from 15.0 ± 4.4 mg/dl at 1.5 hr to 28.9 ± 9.0 mg/dl at 5 hr after ACH, compared with 24.8 ± 12.0 mg/dl for controls. Rats given ACH (0.5 mg/kg, i.p.) at 0 hr after overnight fasting and a second dose at 3 hr showed HTG values which ranged from 3.0 ± 0.8 mg/g at 6 hr to 8.1 ± 1.1 mg/g at 24 hr after ACH, compared with a control value of 3.8 ± 1.4 mg/g; PTG values ranged from 24.7 ± 6.4 mg/dl at 6 hr to 56.1 ± 11.5 mg/dl at 24 hr after ACH, compared with 22.6 ± 10.6 mg/dl for controls. Levels of plasma free fatty acids (FFA) were compared with HTG and PTG at various times in rats given ACH (0.25 mg/kg, i.p.) after 14 hr of fasting and then a second injection 3 hr later. The FFA levels ranged from 0.463 ± 0.122 μM/ml at 2 hr to 0.510 ± 0.112 μM/ml at 4 hr after ACH, compared with a control value of 0.508 ± 0.125 μM/ml. PTG
ranged from 23.9 ± 12.0 mg/dl at 2 hr to 42.7 ± 26.4
mg/dl at 4 hr after ACH (control: 25.8 ± 8.5 mg/dl)
and HTG ranged from 3.4 ± 2.1 mg/g at 6 hr to 4.4 ±
0.93 mg/g at 2 hr after ACH (control: 3.6 ± 1.2 mg/g
Overall, ACH did not cause significant increases in
plasma FFA or in HTG or a significant decrease in
PTG. These results demonstrate that hepatic protei
synthesis inhibition alone is not sufficient to
produce liver triglyceride accumulation, and emphas
the importance of FFA mobilization in the pathogenesis of fatty liver.

1973 PRELIMINARY REPORT. PROLONGED BILIARY FI
TULIZATION IN THE RAT WITHOUT INTERRUPTIO
OF THE ENTEROHEPATIC CYCLE.

(Eng.) Lipsky, M. H.; Berkley, S. (Rhose Island Hosp., Providence, RI 02902). *J. Surg. Res.* 22(1):65-68; 1977.

A technique that permits the collection of bile secretions from laboratory animals intermittently ove
a prolonged period of time without interrupting the
enterohepatic cycle and without permanently immobil
izing the animals is described. Charles River C.O.
male rats were used. Indwelling catheters are plac
in the proximal and distal ends of the bile duct i
a closed-loop shunt system. The free ends of the
two catheters are brought out from the abdomen and
tunneled to the posterior aspect of the neck via a
s.c. route. The free ends are then connected with
Teflon connector, and the base of the connector is
implanted s.c. Bile collections can be obtained b
restraining the animal in a cage and removing the
cap of the connector. Using this procedure, no re
flux of gastrointestinal juices or dilatation of t
bile duct was observed. This technique permits co
tinuous sampling of uncontaminated bile without in
troducing any apparent modifications that could al
the homeostatic mechanisms of bile secretion.

1974 TRANSPLANTATION OF LIVER CELLS IN AN AN
MODEL OF CONGENITAL ENZYME DEFICIENCY D
EASE: THE GUNN RAT.

(Eng.) Sutherland, D. E. R.
Matas, A. J.; Steffes, M. W.; Simmons, R. L.; Naj
ian, J. S. (Univ. Minnesota Health Sciences Cente
Minneapolis, MN 55455). *Transplant. Proc.* 9(1):
319; 1977.

To assess the feasibility of transplanting liver
to supply a missing enzyme in the treatment of co

enital enzymatic deficiency diseases, hepatocytes rom heterozygous Gunn rats were transplanted to omozygous recessive uridine diphosphate glucuronyl ransferase (UDPGT)-deficient Gunn rats, and the efect on bilirubin metabolism was determined. Cells btained from the equivalent of 2 g of adult liver ere infused into the portal vein of 16 homozygous ats and dispersed i.p. in 8 homozygous rats. Five ats received spleen cells from heterozygous adults ia the portal vein, and four additional rats received eonatal donor liver cells. A significant and lastng reduction in plasma bilirubin concentration in he hyperbilirubinemic homozygous Gunn rats was seen nly in the group that received hepatocytes into the ortal vein. At 12 weeks, the mean bilirubin level n this group was 6.7 ± 0.3 mg/100 ml ($p<0.01$), and or the group receiving neonatal hepatocytes, it was .5 ± 1.4 mg/100 ml ($p<0.05$). However, the bilirubin evel never fell to normal (<0.5 mg/100 ml in heteroygous Gunn rats). The results show that transplanation of allogenic hepatocytes to the portal vein an lower plasma bilirubin in congenitally jaundiced unn rats. The potential application for clinical ransplantation requires further study.

975 LIVER REGENERATION: CULTURAL CHARACTERISTICS OF REMNANT LIVER CELLS FOLLOWING A ECOND PARTIAL HEPATECTOMY. (Eng.) Sera, Y.; Sakaoto, Y.; Koga, Y.; Hays, D. M. (Univ. Southern Caliornia Sch. Medicine, 4650 Sunset Blvd., Los Angeles, A 90027). *Experientia* 33(2):194-195; 1977.

38% hepatectomy in mature male Wistar rats was ollowed in 24-72 hr by a 30% hepatic resection to tudy the influence of a prior hepatic resection on he *in vitro* growth capacity of remnant liver cells emoved less than 46 hr after the second resection. ixty rats were subjected to a medial lobectomy (38% esection), followed 24, 40, and 72 hr later by a econd (left) lobectomy. At intervals of 8, 24, 36, nd 48 hr following the second resection, the animals ere sacrificed, and the liver tissue was cultured. ontrols had single 68% or 30% resections. There was o *in vitro* cell survival in tissue removed 8, 24, and 6 hr following single hepatic resection in controls, ut tissue removed 48 hr following single resection howed maximum growth (546 ± 24 cells/plate x 10^3 fter 68% resection; 168 ± 32 cells/plate x 10^3 after 0% resection). Tissue removed at all intervals folowing a second resection survived. Following the 0 hr and 72 hr (second) resections, cell survival as increased with each lengthening of interval post esection, i.e., 8 hr post resection to 48 hr post esection. A second hepatic resection is not followed y a period of growth inhibition, a phenomenon that s always seen up to 46 hr following a single resecion. This suggests that the growth inhibition after single hepatectomy is not related to the trauma of he liver excision.

976 PREVENTION OF GALLSTONE FORMATION IN RABBITS BY THE ORAL ADMINISTRATION OF KANAMYCIN. Eng.) Carlisle, V. F.; Tasman-Jones, C. (Univ. Auckand Sch. Medicine, Auckland, New Zealand). *Surg. ynecol. Obstet.* 144(2):195-198; 1977.

The ability of kanamycin to prevent gallstones and the effect of the antibiotic on bile composition were studied in rabbits. Animals fed a diet containing 40% casein, 15 oleic acid, and 45% laboratory pellets developed glycoallodeoxycholic acid and glycodeoxycholic acid gallstones. The p.o. administration of kanamycin prevented allo bile acid stone formation in the oleic acid-fed rabbit, without leading to cholesterol gallstone formation. Kanamycin reduced the concentration of allodeoxycholic acid in the bile of oleic acid-fed rabbits from 16.6 ± 4.1% of total bile acids to 1.1 ± 1.1% with a reciprocal increase in deoxycholic acid concentration. The allodeoxycholate concentration was far below that found in control bile samples (10.2 ± 2.3%). If the effect of kanamycin on the bile composition is by its antibiotic action, the importance of a hepatic contribution to allodeoxycholate stone formation is eliminated.

1977 LINCOMYCIN-INDUCED CHOLECYSTITIS AND GALLSTONES IN GUINEA PIGS. (Eng.) Scott, A. J. (Univ. Auckland Sch. Medicine, Auckland, New Zealand). *Gastroenterology* 71(5):814-820; 1976.

The effect of lincomycin on the guinea pig gallbladder was investigated to examine the genesis of the drug-induced lesions and the nature of lincomycin toxicity. Guinea pigs given lincomycin (60 mg/kg/day, s.c.) showed a striking increase in the renewal of epithelial cells in the gallbladder. This was detectable after only 24 hr of treatment. By 48 hr, a precipitate consisting predominantly of calcium and bilirubin had formed in the gallbladder. Gallbladder bile glycoprotein concentrations rose progressively. At 8 days, epithelial dysplasia was marked. Treatment was discontinued at 9 days. In guinea pigs that survived beyond 34 days, new tubuloalveolar glands had formed focally in the body and fundus of the gallbladder. Multiple calcium-containing stones were present. The failure to culture bacteria from bile, the failure of the bile salt pattern to change, and the progressive nature of the epithelial injury suggested that the changes resulted from a direct toxic effect and were not dependent on the antibiotic activity of this drug. It is concluded that damage to the epithelium of the gallbladder preceded the formation of a precipitate and initiated histological changes that culminated, at the time that the precipitate became organized into stones, in glandular metaplasia.

1978 UNILATERAL HEPATIC DUCT OBSTRUCTION IN THE PRIMATE. (Eng.) Strasberg, S. M.; Petrunka, C. N.; Ilson, R. G. (Medical Sciences Bldg., Univ. Toronto, Toronto, Ontario M5S 1A8 Canada). *Surgery* 81(1):91-99; 1977.

The effects of obstruction of one hepatic duct were investigated in two studies in the rhesus monkey. A model to divide bile flow from the two sides of the liver was developed in the first study. Bile flow from one side of the liver was obstructed, and backflow from the obstructed biliary tract was investigated in five animals. Test solutions containing BSP and conjugated $[^{14}C]$cholic acid were introduced into the obstructed side of the liver at pressures below and above the maximum secretory pressure. These solutes were detected in the circulation and in the bile on the free side of the liver. BSP, secreted on the free side, was conjugated normally (52.7%) for this species. There was also backflow of water from the obstructed side and continuing secretion into the obstructed side. There were no functionally significant biliary communications between the two separately cannulated portions of the liver. In the second study, graded unilateral obstruction and recovery were studied in five animals. Bile flow, [^{14}C]erythritol clearance, and bile acid, bilirubin, and bicarbonate secretion rates were reduced during obstruction and recovery. The bile:plasma ratio of [^{14}C]erythritol fell significantly (1.13 to 0.97, $p<0.05$) and the bicarbonate concentration increased during partial obstruction ($p<0.05$). On the free side, bile flow, [^{14}C]erythritol clearance, and bile acid secretion rates increased during obstruction. The increase in bile flow was due largely to an increase in canalicular bile acid-dependent flow. The studies indicate that reduced bile flow during acute obstruction is due to both hydrostatic backflow and secretory failure. The latter occurs mainly at the canalicular level, whereas the bile ductules are spared. During acute obstructions, compensations in unobstructed portions of the liver are due to increased secretion of solute at the canaliculus.

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See also, 1759, 1764, 2060, 2156, 2201.

SECRETION AND METABOLISM

Intestine

2058 MECHANISM OF PRODUCTION OF INTESTINAL SECRETION BY ELEVATED VENOUS PRESSURE. (Eng.) Yablonski, M. E.; Lifson, N. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *J. Clin. Invest.* 57(4):904-915; 1976.

The nature of increased fluid secretion by the smal intestine in response to elevated venous pressure was investigated in intestinal loops in dogs and i preparations using the Wells clamp. No net secretion occurred at venous pressure below 35 cm H_2O, t at venous pressures above that threshold, the ount of secretion was essentially linearly related the increment in venous pressure. The rate of crease was approximately 0.045 ml/min/100 g/cm 0. Only small rates of lymph flow were observed low 30 cm H_2O, but increases above that threshold sulted in increased lymph flow roughly propor- onal to increments in venous pressure. Capillary ltration similarly increased linearly with incre- nts of venous pressure above 30 cm H_2O. The lymph ulin concentration was approximately equal to that plasma at all venous pressures. The secretion plasma concentration (S:P) ratios for inulin and abinose were as high as 3 and 1.5, resp., at low tes of secretion, but this ratio decreased as secre- on rates were increased. Protein concentration in e secretion also varied with the rate of secre- on, with S:P ratios of 0.17-0.55 at low rates and duction to 0.17 at higher rates of secretion. The otein concentration of the lymph varied with ven- s pressure, being close to 67% of the plasma level normal venous pressures and falling to 25-50% of asma concentration at higher venous pressures. stribution of protein in the secretion was more ke that of lymph than plasma. Osmolality and dium concentration of the secretion were not sig- ficantly different from that of plasma, but po- ssium and chloride concentrations in the secretion re higher than the plasma concentration. Mucosal ter content did not increase until venous pres- res reached 30 cm H_2O, but nonmucosal water con- nt increased with increasing venous pressure. In- stinal secretion produced by elevated venous pres- re is probably secretory filtration, a passive ocess; the driving force for secretion is an in- ease in mucosal tissue fluid pressures to values 4-6 cm H_2O. The transepithelial channels are obably intercellular, since they are large enough permit passage of inulin and plasma proteins. e threshold value for secretion and associated anges may be explained by dilution of the tissue uid protein colloid osmotic pressure in a small bepithelial, juxtacapillary compartment.

)59 EFFECT OF INDOMETHACIN ON CHOLERA-INDUCED FLUID MOVEMENT, UNIDIRECTIONAL SODIUM
LUXES, AND INTESTINAL cAMP. (Eng.) Wald, A.; Gotter- r, G. S.; Rajendra, G. R.; Turjman, N. A.; Hendrix, . R. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 1205). *Gastroenterology* 72(1):106-110; 1977.

e effects of indomethacin on net fluid movement and idirectional Na fluxes were measured in rabbit je- nal loops exposed to cholera enterotoxin (CT), and ese findings were correlated with intestinal cAMP vels. In untreated animals (no indomethacin), CT ops secreted 0.37 ml/cm/4 hr, compared to absorp- on in control loops of 0.23 ml/cm/4 hr ($p<0.001$). indomethacin (10 mg/kg, i.v. and 10 mg/kg, s.c.)- eated animals, there was a striking reduction of cretion in CT loops (0.07 ml/cm/4 hr, $p<0.001$). sorption in control loops in indomethacin-treated imals was greater than in that untreated animals .42 ml/cm/4 hr, $p<0.02$). Unidirectional Na luxes were greatly depressed in indomethacin-treated imals at 1 hr; in both CT and control loops. is effect disappeared by 4 hr. Intestinal cAMP levels in CT loops, although not elevated at 1 hr despite the onset of secretion, were significantly elevated at 4 hr. Indomethacin did not alter cAMP levels at 1 and 4 hr in either cholera or control loops. These studies support the view that prostaglandin synthesis is not involved in CT-induced elevation of intestinal cAMP. Indomethacin may depress intestinal secretion by inhibiting a prostaglandin-mediated step beyond the generation of cAMP or by acting on some other, as yet unidentified, biological mechanism involved in intestinal secretion.

2060 EFFECT OF PROPRANOLOL ON BILE ACID- AND CHOLERA ENTEROTOXIN-STIMULATED cAMP AND SECRETION IN RABBIT INTESTINE. (Eng.) Taub, M.; Bonorris, G.; Chung, A.; Coyne, M. J.; Schoenfield, L. J. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Gastroenterology* 72(1):101-105; 1977.

The organ specificity of deoxycholic acid (DCA) and cholera enterotoxin (CE), and the selectivity of propranolol (Pr) inhibition were assessed. Three colonic and three jejunal loops were prepared in each of 8 rabbits treated i.v. with Pr (4 mg/kg) 30 min before loop construction and in each of 10 untreated control rabbits. DCA (6 mM; 1 ml), CE, heat-inactivated CE (10 μ/ml), or 0.9% NaCl were injected as basal controls in random order into each of the loops. The volume of luminal fluid and mucosal adenylate cyclase (AC) were measured in each intestinal loop 5 hr later. DCA in the colon stimulated AC 2-fold ($p<0.01$) and luminal fluid 15-fold ($p<0.01$). CE in the jejunum stimulated AC 2.3-fold ($p<0.01$) and luminal fluid, 9-fold ($p<0.01$). No significant effects on volume or AC occurred in response to CE in the colon or to DCA in the jejunum. Pr pretreatment completely prevented the stimulation of AC and luminal fluid by DCA in the colon, but did not affect the action of CE in the jejunum of the same animals. The results show that DCA and CE are organ-specific stimulants of cyclic AMP systems and that Pr is a selective inhibitor of certain inducers of cyclic AMP and net secretion.

2061 STIMULATION OF COLONIC GLYCOPROTEIN SYNTHESIS BY DIBUTYRYL CYCLIC AMP AND THEOPHYLLINE. (Eng.) LaMont, J. T.; Ventola, A. (Peter Bent Brigham Hosp., Boston, MA 02115). *Gastroenterology* 72(1):82-86; 1977.

Because bile salts, cholera toxin, and *Escherichia coli* enterotoxin have been found to stimulate the release of intestinal goblet cell mucus, the effects of dibutyryl cyclic AMP (B_2cAMP) and theophylline on glycoprotein synthesis in rabbit colon were studied in mucosal organ cultures using ^{3}H-glucosamine as a precursor. Addition of B_2cAMP (1 mM) to culture medium caused a significant increase in glycoprotein synthesis after 12 and 24 hr, compared with biopsies cultured in control medium. The increase in glycoprotein synthesis was observed only if the cyclic nucleotide was present continuously in the incubation medium for at least 12 hr. The stimulatory effect of B_2cAMP on ^{3}H-glucosamine incorporation was blocked by

1 mg/ml cycloheximide. B_2cAMP also stimulated mucosal uptake of glucosamine into the intracellular pool and markedly enhanced the specific activity of mucosal galactosyltransferase. The addition of 5 mM theophylline caused a greater than twofold increase in cAMP levels, which was also accompanied by an increase in glucosamine uptake and incorporation into mucosal glycoproteins. The results demonstrate that elevation of intracellular cAMP concentration in colon epithelium *in vitro* is associated with an increase in glycoprotein synthesis. These effects may be mediated in part by an increased uptake of glycoprotein precursors such as glucosamine, and an increased activity of glycoprotein synthetic enzymes.

2062 SOLUBILIZATION, PARTIAL PURIFICATION AND RADIOASSAY FOR THE INTRINSIC FACTOR RECEPTOR FROM THE ILEAL MUCOSA. (Eng.) Cotter, R.; Rothenberg, S. P. (New York Medical Coll., 1249 Fifth Ave., New York, NY 10029). *Br. J. Haematol.* 34(3):477-487; 1976.

The purification of a macromolecule that binds intrinsic factor saturated with vitamin B_{12} solubilized from guinea pig ileum was monitored by a radiometric assay. The intrinsic factor-[^{57}Co]vitamin B_{12} complex coupled to the solubilized receptor precipitated at 15% sodium sulphate, while intrinsic factor-[^{57}Co]B_{12} alone remained soluble at this salt concentration. This radioassay also permitted the *in vitro* study of the interaction of the solubilized receptor and intrinsic factor saturated with ^{57}CoB_{12}. The receptor did not bind intrinsic factor-[^{57}Co]B_{12} below pH 5, while binding was observed to pH 9.0. Binding was equivalent at 37 C and 25 C, but was markedly reduced at 4 C and 56 C, and was destroyed at 100 C. The receptor resisted 60 min of digestion by trypsin, chymotrypsin, pronase, and subtilisin. After 180 min of digestion, pronase and subtilisin inactivated 90% and 41% of the receptor, resp., whereas trypsin and chymotrypsin inactivated only 21% and 23%, resp. Trisodium EDTA inhibited the binding of intrinsic factor-[^{57}Co]B_{12} to the receptor, and this inhibition was reversed by the addition of excess Ca^{2+}. Kinetic analysis of the reaction indicated a maximum velocity of 0.083 nmol intrinsic factor bound B_{12}/min with a K_m of 1.36×10^{-10} M. The solubilized receptor had a greater affinity for intrinsic factor bound to vitamin B_{12} than for intrinsic factor free of vitamin B_{12}. The solubilization of this intrinsic factor receptor without chemicals suggests that it is not an integral component of the microvillus membranes hydrophobically bonded to the lipid matrix, but rather a peripheral protein weakly associated with the membrane by noncovalent interaction.

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IMULATION OF CYCLIC AMP PRODUCTION [Abstract].
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IUM OF RACHITIC AND VITAMIN D-REPLETED CHICKS [Ab-
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081 CONTROL OF INTESTINAL VITAMIN D DEPENDENT CALCIUM BINDING PROTEIN (CABP) BY FEEDING
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2088 INCREASED INTESTINAL CHROMATIN TEMPLATE ACTIVITY: INFLUENCE OF Lα,25-DIHYDROXY VITAMIN D$_3$ AND HORMONE-RECEPTOR COMPLEXES [Abstract]. (Eng.) Zerwekh, J. E. (Arizona Medical Center, Tucson, AZ 85724). *Fed. Proc.* 35(3):339; 1976.

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2095 GASTROINTESTINAL CONTROL OF SODIUM EXCRETION IN SODIUM-DEPLETED CONSCIOUS RABBITS. (Eng.) Carey, R. M.; Smith, J. R.; Ortt, E. M. (Univ Virginia Sch. Medicine, Charlottesville, VA 22901). *Am. J. Physiol.* 230(6):1504-1508; 1976.

See also, 1748, 1749, 1750, 1760, 1776, 1792, 1809, 1810, 1872, 1873, 1874, 1955, 2096, 2353.

GENERAL

2096 UNSTIRRED LAYER THICKNESS IN PERFUSED RAT JEJUNUM IN VIVO. (Eng.) Winne, D. (Pharmakologisches Institut, Universitat Tubingen, Wilhelmstrasse 56, D-7400 Tubingen, W. Germany). *Experientia* 32(10):1278-1279; 1976.

A better mixing of the luminal solution and a reduction of the unstirred layer in the rat jejunum was achieved *in vivo* by altering a previously reported *in vitro* method, and the effective unstirred layer thickness was calculated. The method involves the simultaneous perfusion of a buffered solution and air, so that alternate segments of fluid and air pass the lumen ("segmented flow"). Jejunal loops of male rats were perfused with a buffered solution containing ^{14}C-labeled L-phenylalanine and phenol red as volume marker. The appearance rate of L-phenylalanine in intestinal venous blood collected from the descending jejunal vein was calculated from the weight (g) and the ^{14}C-activity (μCi/ml) of the blood using its specific weight (g/ml), the specific activity (μCi/mol), the duration of the sampling period (min), and the wet tissue weight of the loop (g). In three consecutive 15-min experimental periods, the L-phenylalanine-containing solution was perfused in the following manner: 0.5 ml/min (treatment A), 0.5 ml/min + 0.5 ml/min air (treatment B), and 1 ml/min (treatment C). The absorption rate after treatment B was significantly increased ($p<0.001$) over that after treatment A, the absorption rate being higher by a factor of 1.74, and after treatment C, the absorption rate being higher by a factor of 1.52. The unstirred layer thickness, calculated by determining the change of the absorption rate using segmented and nonsegmented flow, was about 0.5 mm, which exceeds the thickness reported *in vitro* (150-200 μm). Higher K_m values previously obtained *in vivo* for carrier-mediated transport processes in the intestine may be explained, at least in part, by the larger effective thickness of the unstirred layer.

2097 RADIOIMMUNOASSAY MEASUREMENT OF SECRETIN HALF-LIFE IN MAN. (Eng.) Kolts, B. E.; McGuigan, J. E. (Hillis Miller Health Center, Univ. Florida, Gainesville, FL 32601). *Gastroenterology* 72(1):55-60; 1977.

Using a secretin radioimmunoassay, fasting serum concentrations were determined in dogs and humans; the serum secretin half-life in man and responses to duodenal acidification and to a protein meal in dogs were also measured. High titer antibodies to secretin were produced in rabbits by immunization with pur fied porcine secretin conjugated to bovine serum albumin in complete Freund's adjuvant. Synthetic porcine secretin was labled with ^{125}I using chloramine-T, and radiosecretin was purified using talc-silica and fibrocellulose powder. Specificity of antibodies to secretin was extensively evaluated in studies examining cross-reactivity with other naturally occurring hormones, parallelism of serum dilutions and secretin standards, quantitative recovery of secretin added to serum samples, and changes in circulating immunoreactive secretin in response to intraduodenal acidification. The mean fasting serum secretin concentration in 10 dogs was 65 ± 5 pg/ml, and in 21 healthy human volunteers, it was 69 ± 5 pg/ml. In response to intraduodenal instillation of 10 mEq of HCl, portal venous secretin concentrations increased from a mean fasting value of 52 to 450 pg/ml within 2 min; peripheral venous secretin increased from 66 to 229 pg/ml within 5 min. No significant changes in peripheral serum immunoreactive secretin concentrations were identified in dogs after a protein meal. Secretin administered i.v. in man disappeared from the ci culation with a mean half-life of 4.06 ± 0.82 min.

2098 ROLE OF MECHANICAL STIMULATION IN MAINTAINING SMALL INTESTINAL MASS IN THIRY-VELLA LOOPS IN THE RAT. (Eng.) Fenyo, G. (Karolinska sjukhuset, S-104 01 Stockholm 60, Sweden). *Eur. Surg. Res.* 8(5):419-427; 1976.

The effect of mechanical stimulation on small intestinal mass was evaluated by constructing two 10-cm-long Thiry-Vella (TV) loops in each of 20 Sprague-Dawley rats. An elastic-plastic device, which served as a source of continuous intraluminal mechanical stimulation, was fixed in one of the loop Two weeks later, the jejunum, ileum, and both TV loops were biopsied. Wet and dry weight per 3 cm intestine, villus height and muscular thickness, were determined. Both TV loops were atrophic. The

t and dry weights in the mechanically stimulated
op (165 ± 7 and 35 ± 1.4 mg/3 cm intestine, resp.)
re significantly greater than in the nonstimulated
op (115 ± 6 and 24 ± 1.3 mg/ 3 cm, resp., $p<0.001$).
scular thickness in the stimulated loop (113 ± 7
) was also significantly greater than that in the
stimulated loop (76 ± 6 μm, $p<0.001$). The villus
ight was not significantly affected by the mechan-
al stimulation. The experiments demonstrate that
e effect of mechanical stimulation on the food-
prived small intestine is limited to a certain
gree of muscular hypertrophy, resulting in a les-
r degree of atrophy expressed in terms of wet and
y weight of the intestine.

99 COLONIC EPITHELIAL CELL PROLIFERATION AFTER 40 PERCENT SMALL INTESTINAL RESEC-

ON: AUTORADIOGRAPHIC STUDIES IN THE RAT. (Eng.)
Dermott, F. T.; Roudnew, B. (Alfred Hosp., Prahran
81, Victoria, Australia). *Virchows Arch [Cell*
thol.] 22(4):353-357; 1976.

e kinetics of the colonic crypt cell population
re investigated by autoradiography with tritiated
ymidine in male Sprague-Dawley rats 60 days after
e resection of a jejunal segment equivalent to
% of the length of the small intestine. No sig-
ficant differences ($p>0.1$) were found in the mean
tal number of cells per crypt cell column, the
an number of labeled cells per crypt cell column,
beling and mitotic indices, or the columnar globlet
ll indices in the colons of sham-operated and ex-
rimental rats. Labeled cells were distributed with
milar frequency over identical cell positions in
th groups, and the sizes of the proliferative and
ture cell zones were comparable. The absence of
ange in the colon after 40% intestinal resection
es not support the proposed existence of a systemic
ctor regulating both small intestinal and colonic
ithelial cell population kinetics after small
testinal resection.

00 THE EFFECT OF ISCHEMIC VILLUS CELL DAMAGE ON CRYPT CELL PROLIFERATION IN THE SMALL

TESTINE: EVIDENCE FOR A FEEDBACK CONTROL MECHA-
SM. (Eng.) Rijke, R. P. C.; Hanson, W. R.; Plais-
r, H. M.; Osborne, J. W. (Dept. Cell Biology and
netics, Erasmus Univ. Rotterdam, P.O. Box 1738,
tterdam, Netherlands). *Gastroenterology* 71(5):
6-792; 1976.

test the hypothesis that the number of villus
lls regulates crypt cell proliferation in the
all intestinal epithelium, the villus cell popu-
tion in male Glaxo-Wistar rats was reduced by
amping the superior mesenteric artery and vein
r 1 hr, and the effects on the intestinal epi-
elium were studied during the first 24 hr. Tem-
rary interruption of the blood flow to the small
testine led to a 50% decrease in the number of
nctional villus cells within 2 hr; preferentially,
lls from the upper part of the villus were lost,
d the number of crypt cells was not affected.
is reduction in the number of villus cells led to
increase in the percentage of labeled crypt cells
ter pulse labeling with [^{3}H]thymidine and an expansion of the proliferative cell compartment in the crypt. After a peak of proliferative activity at 16 hr, the investigated crypt cell kinetic parameters approached control values after 24 hr, as did the number of villus cells. The enzyme activities of nonspecific esterase and neutral α-glucosidase showed marked decreases in isolated crypt and villus cell compartments as crypt cell proliferation increased. These data support the hypothesis of a feedback control of crypt cell proliferation by the functional villus cells and confirm earlier data on the influence of changing cell kinetics on crypt cell maturation. Additional data obtained after creating temporary ischemia in part of the small intestine support the view that the feedback control of proliferation by the villus cells is a local control mechanism.

2101 INTESTINAL RECIRCULATION IN THE MANAGEMENT OF EXPERIMENTAL SHORT BOWEL SYNDROME.

(Spa.) Lopez Perez, G. A.; Gaztambide Casellas, J.; Quadri Duque, A. (San Juan de Letran, 9, 5 C, Malaga, Spain). *An. Esp. Pediatr.* 8(3):243-248; 1975.

Following major resection of 80% of the intestine of 33 newborn dogs, the animals underwent end-to-end anastomosis (14), isoperistaltic ileal loop operation (16), or Mackby circular loop operation (3). Seven animals died within 24-36 hr of the first resection; two animals died from accidents and six died of peritonitis. Of the 18 surviving animals, 7 of 8 with end-to-end anastomosis died of malabsorption; malabsorption and peritonitis resulted in death in 3 and 2, resp., of the 9 dogs with isoperistaltic ileal loops. The authors favor the isoperistaltic ileal loop procedure of intestinal resection as it avoids intraluminal stasis and secondary abnormal bacterial proliferation.

2102 EXPERIMENTAL MODEL OF ULCERATIVE COLITIS.

(Eng.) Ceredig, R.; Henderson, D. C.; Nairn, R. C. (Monash Univ. Medical Sch., Prahran, Melbourne, Australia). *Nature* 266(5597):74-75; 1977.

The induction of inflammatory ulcerative changes in rat colon mucosa, as an experimental model of ulcerative colitis, is reported. Rat fetal colon implants beneath the renal capsule of syngeneic adult Sprague-Dawley rats developed, by 6 days, acute inflammation; by 12 days, ulceration of the mucosa morphologically indistinguishable from active ulcerative colitis was present. Plasma cells were present, and the ulcerated mucosa was infiltrated by neutrophil granulocytes. Over the succeeding days, the mucosa became depleted of mucin-secreting cells, and by 20 days, it was largely destroyed. With a single exception, the implanted syngeneic fetal colon remained structurally and functionally viable after 28 days, as shown by vascularization by recipient blood vessels. The pathological changes were not attributable to sex-related antigenicity. Serum samples from most rats 10 days after implanting syngeneic fetal colon contained antibody reactive with fetal intestinal mucosa but not adult mucosa, as judged by indirect immunofluorescent staining; this indicates an immune reaction in adult rats to fetal antigens deficient in the adult animal. This rat system should provide a useful new model for investigating immunologically-determined colonic inflammatory disease.

2103 OXIDATION OF α-METHYLDOPA AND OTHER CATECHOLS BY CYTOCHROME P-450-GENERATED SUPEROXIDE ANION: POSSIBLE MECHANISM OF METHYLDOPA HEPATITIS.

(Eng.) Dybing, E.; Nelson, S. D.; Mitchell, J. R.; Sasame, H. A.; Gillette, J. R. (Dept. Environmental Toxicology, Natl. Inst. Public Health, Oslo 1, Norway). *Mol. Pharmacol.* 12(6): 911-920; 1976.

To determine whether the toxicity of α-methyldopa might be due to a reactive metabolite, $[^3H]$α-methyldopa was incubated with rat liver microsomes in the presence of an NADPH-generating system. A large amount of covalent binding occurred, but only in the presence of NADPH and oxygen (V_{max}=0.5 nmol/mg/min; K_m= 0.5 μM). The binding was inhibited by a $CO-O_2$ atmosphere (9:1), indicating the involvement of cytochrome P-450. However, α-methyldopa did not show P-450 binding spectra (type I, II, or III), and its covalent binding was inhibited by superoxide dismutase (15 μg/ml), ascorbic acid (1 mM), ethylenediamine (20 mM), and glutathione (1 mM), indicating that α-methyldopa was being oxidized by cytochrome P-450-generated superoxide anion to a reactive semiquinone and/or quinone. The covalent binding was inhibited by 42-79% by analogues such as L-dopa, dopamine, epinephrine, norepinephrine, and catechol, but not by 3-*O*-methyldopa, indicating a requirement for the unsubstituted catechol nucleus. Additional studies demonstrated that the rat microsomal system could be replaced by human hepatic microsomes or by a xanthine oxidase system, and the binding was again inhibited by superoxide dismutase. Metabolic activation by superoxide anion may play a role in the hepatotoxicity of this and other catechols, including hydroxylated estrogens.

2104 THE PATHOLOGY OF VIRAL HEPATITIS TYPES A AND B IN CHIMPANZEES: A COMPARISON.

(Eng.) Dienstag, J. L.; Popper, H.; Purcell, R. H. (Natl. Inst. Allergy and Infectious Diseases, Natl. Insts. Health, Bldg. 7, Room 310, Bethesda, MD 20014). *Am. J. Pathol.* 85(1):131-144; 1976.

The histologic manifestations in the livers of chimpanzees inoculated with hepatitis A and B virus were compared with each other, with those in man, and were correlated with biochemical, serologic, and virologic observations. The alterations in hepatitis A- and B-inoculated chimpanzee livers were similar to those seen in human hepatitis, but the lesions--particularly the hepatocellular necrosis--were far milder. The hepatocytic alterations in hepatitis A in chimpanzees were mainly restricted to the periportal areas, and the parenchymal changes were less severe than the portal inflammation. The lesions correlated well with biochemical changes, the presence of virus in the liver, and its shedding in the stool. Experimental type B hepatitis involved the entire lobular parenchyma, and was more severe in the lobular centers, while portal inflammation was less conspicuous. Biochemical alterations and presence of virus in the liver correlated with these lesions, and the antibody response was similar to that seen in man. The chimpanzee is a useful model for studying the pathogenesis of viral hepatitis; additional study of serial morphologic events may contribute to the understanding of the clinical differences between hepatitis types A and B.

2105 PARACETAMOL-INDUCED HEPATIC NECROSIS IN THE MOUSE--RELATIONSHIP BETWEEN COVALENT BINDING, HEPATIC GLUTATHIONE DEPLETION AND THE PROTECTIVE EFFECT OF α-MERCAPTOPROPIONYLGLYCINE.

(Eng.) Labadarios, D.; Davis, M.; Portmann, B.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5 8RX, England). *Biochem. Pharmacol.* 26(1):31-35; 1977.

The mechanism by which α-mercaptopropionylglycine (α-MPG) reduces the hepatotoxicity of paracetamol in mice was investigated. The severity of hepatic necrosis in mice that received paracetamol 3.31 mmol/kg, p.o., was significantly greater than after a 2.65 mmol/kg dose, and the quantity of a reactive metabolite of the drug bound to hepatocyte macromolecules was significantly greater after the higher dose. α-MPG, given together with 3.31 mmol/kg paracetamol, afforded significant protection against hepatic necrosis, as assessed histologicall but had no significant effect on the quantity of paracetamol metabolite bound within the liver. α-MPG did not increase levels of reduced glutathion in the liver, nor did it prevent the fall in hepati glutathione content observed in animals receiving hepatotoxic doses of paracetamol without the protective agent. α-MPG had no effect on the metabolism of paracetamol, as judged by the urinary excretion of conjugates of the drug. It is conclud that binding of the reactive metabolite of paracetamol to hepatocyte macromolecules need not lead to hepatic necrosis, provided that sulfhydryl group are present in the liver to prevent the deleterious effects of such binding. This appears to be the mode of action for α-MPG.

2106 A CONTROLLED TRIAL OF GLUCAGON IN EXPERIMENTAL PANCREATITIS.

(Eng.) Waterworth, M. W.; Barbezat, G. O.; Hickman, R.; Terblanche, J. (Royal Infirmary, Birmingham, England). *Br. J. Sur* 63(8):617-620; 1976.

The value of glucagon infusion therapy was assessed in pigs with experimentally-induced pancreatitis. The condition was induced by the injection of bile (1.0 ml/kg) into the pancreatic duct immediately after the i.v. injection of secretin (1 U/kg). Macroscopic hemorrhagic pancreatitis ensued immediately, and was accompanied by a 5- to 10-fold increase in the serum amylase level. Eighteen hour after the induction of pancreatitis, 15 animals received a bolus of 0.5 mg glucagon, followed immediately by a continuous infusion of 15 μg/kg/hr for 6 hr, and 10 μg/kg/hr for a further 18 hr. Controls were given i.v. saline. Fourteen treated imals survived for 1 week, and three died within weeks, after which the remaining animals were crificed. Ten controls died within the first eek. Serum amylase levels in both groups began to ecline when infusion was commenced, but levels in e treated group were significantly lower than in e controls. Autopsy showed prominent peripan-reatic granulation tissue in the treated animals, significant incidence of pericarditis in both roups, and pancreatic pseudocysts in three controls d one treated animal. The results suggest that lucagon effectively reduces the mortality in pigs ith experimental pancreatitis and that a controlled linical trial of treatment is justified.

107 IS THE LESSER CURVATURE AN AREA ESPECIALLY SUSCEPTIBLE TO INJURY BY DUODENAL CONTENTS? Eng.) Lawson, H. H. (Baragwanath Hosp., Johannes-urg, South Africa). *Br. J. Surg.* 63(8):589-591; 976.

n dogs, the total duodenal contents were diverted n to the lesser curvature, and the subsequent hronic gastric mucosal reaction (CGMR) was examined n different areas of the stomach. Two dogs were acrificed 3 and 6 months, resp., after the duodenal ontents had been diverted; this was accomplished y transecting the duodenum in two places (near the tomach and 10 cm beyond the duodenojejunal flexure), ividing the descending branch of the left gastric rtery, anastomosing the proximal duodenal loop to he middle of the lesser curvature, and creating n end-to-end anastomosis between the cut end of he stomach and the distal loop. In both dogs, the toma was surrounded by an area of CGMR that spread utwards in all directions; after 3 months, the GMR had not reached the greater curvature, but fter 6 months, the whole greater curvature was ffected, except for a small area on the anterior nd posterior walls of the zone adjacent to the astric outlet. After 6 months, the reaction on he lesser curvature was limited mainly to the area f the stoma. The types of CGMR seen around the toma in both cases were pseudopyloric metaplasia nd intestinal metaplasia. In both experiments, he CGMR was most marked at the point of entry of he duodenal contents on the lesser curvature; his is either an indication that the lesser urvature is an area of increased susceptibility o injury or simply that this was the point of ntry of the duodenal contents, and hence the point f greatest stimulation. These results, and the indings of others, support the latter explanation. he reason that chronic gastric ulceration commonly ccurs along the lesser curvature may be that efluxing duodenal contents follow the anatomical osition of the lesser curvature.

108 INHIBITION OF STRESS ULCER FORMATION WITH SOMATOSTATIN IN RATS. (Eng.) Zierden, .; Hengst, K.; Wagner, H.; Gerlach, U. (Medizinische linik und Poliklinik, Universitat Munster, Westring , D-4400 Munster, W. Germany). *Res. Exp. Med. Berl.)* 168(3):199-201; 1976.

The possible prophylactic effect of somatostatin on ulcer formation was investigated in rats. Ten rats received somatostatin (100 mEq, s.c.) before and 3 and 6 hr after the administration of 9 hr of stress (restraint). All of 13 untreated control rats showed multiple gastric ulcers following stress, the mean total ulceration area for each rat being 16.67 ± 1.86 mm^2 and the ulcer index being 100%. Eight treated rats had no ulcers. The mean total ulceration area was reduced to 1.20 ± 1.09 mm^2 ($p<0.001$), and the ulcer index was reduced to 20% ($p<0.001$) in the treated rats that developed ulcers. There was also a significant reduction in the size of the ulcers in the treated animals. The results demonstrate that somatostatin protects against stress ulceration in the rat.

2109 ORGAN-CULTURE METHODS IN THE STUDY OF GASTROINTESTINAL-MUCOSAL FUNCTION AND DEVELOPMENT. (Eng.) Trier, J. S. (Peter Bent Brigham Hosp., Boston, MA 02115). *N. Engl. J. Med.* 295(3):150-155; 1976.

2110 TRANSPLACENTAL PASSAGE OF LABEL AFTER ADMINISTRATION OF [^{3}H]RETINOIC ACID (VITAMIN A ACID) TO PREGNANT MICE. (Eng.) Kochbar, D. M. (Sch. Medicine, Univ. Virginia, Charlottesville, VA 22901). *Teratology* 14(1):53-64; 1976.

2111 AN AUTORADIOGRAPHIC STUDY ON THE LOCALIZATION OF ^{131}I-LABELED THYROID HORMONE IN THE TISSUES OF THE PIG. (Eng.) Prakash, P.; St. Clair, L. E.; Romack, F. E. (Coll. Veterinary Medicine, Univ. Illinois, Urbana, IL). *Anat. Anz.* 139(4):321-331; 1976.

2112 BIOLOGICAL AVAILABILITY OF IRON SUPPLEMENTS FOR RATS, CHICKS, AND HUMANS. (Eng.) Pennell, M. D.; Davies, M. I.; Rasper, J.; Motzok, I. (Coll. Biological Science, Univ. Guelph, Guelph, Ontario N1G 2W1, Canada). *J. Nutr.* 106(2): 265-274; 1976.

2113 SYNTHESIS AND PROPERTIES OF 16-HYDROXY ANALOGS OF PGE_2. (Eng.) Bruhn, M.; Brown, C. H.; Collins, P. W.; Palmer, J. R.; Dajani, E. Z.; Pappo, R. (Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Tetrahedron Lett.* (4):235-238; 1976.

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2115 ANTITROPHIC EFFECTS OF SECRETIN [Abstract]. (Eng.) Wiseman, D. A.; Grossman, M. I.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77025). *Fed. Proc.* 35(3):217; 1976.

2116 SEROTONIN IN THE PORTAL VEIN AFTER ACIDIFICATION. (Eng.) Koren, E.; Wapnick, S.; Solowiejczyk, M.; Pfeifer, Y.; Sulman, F. G. (Ichilov Municipal-Governmental Medical Center, Tel Aviv, Israel). *Int. Surg.* 61(6/7):370-371; 1976.

2117 UROGASTRONE AND EPIDERMAL GROWTH FACTOR SHARE A COMMON RECEPTOR IN CULTURED HUMAN FIBROBLASTS [Abstract]. (Eng.) Hollenberg, M. D.; Gregory, H. (Johns Hopkins Medical Sch., Baltimore, MD). *Clin. Res.* 24(3):286A; 1976.

2118 EFFECTS OF VASOPRESSIN ON PRIMATE MESENTERIC BLOOD FLOW [Abstract]. (Eng.) Freedman, A. R.; Kerr, J. C.; Swan, K. G. (New Jersey Medical Sch., Newark, NJ). *Clin. Res.* 24(5):628A; 1976.

2119 THE EFFECT OF HEMORRHAGIC SHOCK AND RESUSCITATION ON GASTROINTESTINAL BLOOD FLOW IN CYNOMOLGUS MONKEYS [Abstract]. (Eng.) Zinner, M. J.; Gurll, N. J.; Reynolds, D. C. (Walter Reed Army Inst. Res., Washington, DC 20012). *Fed. Proc.* 35(3):450; 1976.

2120 PARTIAL DISSOCIATION BETWEEN SALIVARY SECRETION AND ACTIVE POTASSIUM TRANSPORT IN THE PERFUSED CAT SUBMANDIBULAR GLAND. (Eng.) Laugesen, L. P.; Nielsen, J. O. D.; Poulsen, J. H. (Inst. Medical Physiology A, Univ. Copenhagen, 28 Juliane Maries Vej, DK-2100 Copenhagen O, Denmark). *Pfluegers Arch.* 364:167-173; 1976.

2121 THE GLYCOSPHINGOLIPIDS OF RAT SUBLINGUAL AND SUBMAXILLARY GLANDS. (Eng.) Slomiany, A.; Annese, C.; Slomiany, B. L. (New York Medical Coll., Valhalla, NY 10595). *Biochim. Biophys. Acta* 441(2):316-326; 1976.

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2124 USE OF MICROSPHERES TO STUDY SMALL INTESTINAL VILLUS BLOOD FLOW [Abstract]. (Eng.) Bond, J. H.; Levitt, M. D. (Veterans Admin. Hosp., Minneapolis, MN). *Clin. Res.* 25(3):308A; 1976.

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2126 EFFECTS OF INTRALUMINAL PRESSURE ON OXYGEN SUPPLY OF THE RABBIT ILEUM WALL AND IMPROVEMENT OF CIRCULATION BY DEXTRAN [Abstract]. (Eng.) Therman, M.; Richter, H.; Jostarndt, L.; Tichai, I. (Dept. Surgery, Univ. Marburg/Lahn, W. Germany). *Fed. Proc.* 35(3):526; 1976.

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2128 INTESTINAL VASCULAR AND SECRETORY RESPONSES TO GASTROINTESTINAL HORMONES [Abstract]. (Eng.) Fara, J. W.; Campbell, R. (Health Science Center, SUNY, Stony Brook, NY 11794). *Fed. Proc.* 35(3):449; 1976.

2129 MECHANISM OF INTESTINAL SMOOTH MUSCLE RESPONSE TO THE C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ (CCK-OP) [Abstract]. (Eng.) Stewart, J. J. (Univ. Texas Medical Sch., Houston, TX 77025). *Fed. Proc.* 35(3):218; 1976.

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2136 THE EFFECT OF MAJOR SMALL BOWEL RESECTION ON SERUM PROTEINS IN THE RAT [Abstract]. (Eng.) Urban, E. (Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 24(1):45A; 1976.

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2141 INHIBITION OF ASPIRIN AND TAUROCHOLIC ACID-INDUCED GASTRIC MUCOSAL BLEEDING BY PROSTAGLANDIN 15(R)15 METHYL-E2 METHYLESTER [Abstract]. (Eng.) Carmichael, H. A.; Nelson, L.; Chandra, V.; Lyon, A.; Cochran, K. M.; Russell, R. I. (Royal Infirmary, Glasgow, Scotland). *Gut* 16(10):822; 1975.

2142 SPONTANEOUS RUPTURE OF THE STOMACH IN THE NEWBORN: CLINICAL AND EXPERIMENTAL EVALUATION. (Eng.) James, A. E., Jr.; Heller, R. M., Jr.; White, J. J.; Schaefer, J. A.; Shaker, I. J.; Haller, J. A., Jr.; Dorsi, J. P. (Johns Hopkins Medical Inst., Baltimore, MD). *Pediatr. Res.* 10(2):79-82; 1976.

2143 GASTRIC IRRITANCY OF ASPIRIN AND ITS CONGENERS: ANTI-INFLAMMATORY ACTIVITY WITHOUT THIS SIDE-EFFECT. (Eng.) Rainsford, K. D.; Whitehouse, M. W. (Univ. Tasmania Medical Sch., G.P.O. Box 252c, Hobart, Tasmania, 7001, Australia). *J. Pharm. Pharmacol.* 28(7):599-601; 1976.

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2146 SOME FACTORS INVOLVED IN THE SYNERGISTIC INTERACTION BETWEEN ASPIRIN AND STRESS WHICH RESULTS IN SEVERE GASTRIC MUCOSAL DAMAGE [Abstract]. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., Hobart, Tasmania, 7001, Australia). *Clin. Exp. Pharmacol. Physiol.* 3(3):245-246; 1976.

2147 PREVENTION OF PROMETHAZINE-INDUCED ULCERS IN GUINEA PIGS WITH DISODIUM CROMOGLYCATE. (Eng.) Sadeghi, Dj.; Zarrindast, M. R.; Ghaffarpur, F. A. (Faculty Medicine, Univ. Tehran, Tehran, Iran). *Toxicol. Appl. Pharmacol.* 35(1):179-181;; 1976.

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2149 FUNCTIONAL MARKERS AND GROWTH BEHAVIOR OF PRENEOPLASTIC HEPATOCYTES. (Eng.) Williams, G. M. (American Health Foundation, Valhalla, NY 10595). *Cancer Res.* 36(7, Part 2):2540-2543; 1976.

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2151 SEQUENTIAL PHENOTYPIC CHANGES IN HYPERPLASTIC AREAS DURING HEPATOCARCINOGENESIS IN THE RAT. (Eng.) Kitagawa, T. (Cancer Inst., Tokyo 170, Japan). *Cancer Res.* 36(7, Part 2): 2534-2539; 1976.

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2154 DIFFERENTIAL MECHANISMS OF INCREASED α_1-FETOPROTEIN PRODUCTION IN RATS FOLLOWING CARBON TETRACHLORIDE INJURY AND PARTIAL HEPATECTOMY. (Eng.) Watanabe, A.; Miyazaki, M.; Taketa, K. (Okayama Univ. Medical Sch., Okayama 700, Japan). *Cancer Res.* 36(7, Part 1):2171-2175; 1976.

2155 CRITICAL ROLE OF LIPID PEROXIDATION IN CARBON TETRACHLORIDE-INDUCED LOSS OF AMINOPYRINE DEMETHYLASE, CYTOCHROME P-450 AND GLUCOSE 6-PHOSPHATASE. (Eng.) Glende, E. A., Jr.; Hruszkewycz, A. M.; Rechnagel, R. O. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *Biochem. Pharmacol.* 25(19):2163-2170; 1976.

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2157 CELL MODULATION IN THE REGENERATING LIVER FOLLOWING PARTIAL HEPATECTOMY: AN AUTORADIOGRAPHIC STUDY. (Eng.) Sengupta, P. (Nilratan Sircar Medical Coll., Calcutta, India). *Indian J. Med. Res.* 64(5):680-687; 1976.

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2159 EXPERIMENTAL STUDY IN THE RAT OF CONSEQUENCES OF THE PANCREATOGRAPHY. INVESTIGATIONS BY OPTIC AND ELECTRON MICROSCOPY [Abstract]. (Eng.) Serot, J. M.; Gaucher, P.; Rauber, G.; Jeanpierre, R.; Benichoux, R.; Grignon, G. (C.H.U. Brabois-Nancy, France). *Biol. Gastroenterol. (Paris)* 9(1):65; 1976.

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2161 ABLATIVE SURGERY FOR NECROTIZING PANCREATITIS. (Eng.) Henry, L. G.; Condon, R. E. (Veterans Admin. Center, Wood, WI 5319 *Am. J. Surg.* 131(1):125-128; 1976.

2162 INFLUENCE OF DIETARY FACTORS ON THE PANCREATOTOXICITY OF ETHIONINE. (Eng.) Lombardi, B. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15251). *Am. J. Pathol.* 84(3):633-648; 197

2163 PANCREATIC REGENERATION FOLLOWING SURGICAL RESECTION [Abstract]. (Eng.) Pearson, K. W.; Scott, D.; Torrance, H. B. (Manchester Royal Infirmary, Manchester, England). *Biol. Gastroenterol. (Paris)* 9(1):76-77; 1976.

See also, 1751, 1761, 1864, 1880, 2083, 2263, 2417, 2418.

DIAGNOSTIC PROCEDURES

164 RELIABILITY OF CHEMICAL TESTS FOR FECAL OCCULT BLOOD IN HOSPITALIZED PATIENTS.

Eng.) Morris, D. W.; Hansell, J. R.; Ostrow, J. D.;
ee, C. S. (Rutgers Medical Sch., Piscataway, NJ
8854). *Am. J. Dig. Dis.* 21(10):845-852; 1976.

he reactions of three chemical spot tests for fecal
ccult blood were compared with the "true" blood
oss, as determined by stool radioassay, in 39 pa-
ients with suspected gastrointestinal bleeding, fol-
owing the i.v. injection of ^{51}Cr-labeled RBC.
uaiac reagent and orthotolidine (Hematest®) tablets
ere extremely sensitive, but yielded false-positive
eaction rates of 72% and 76%, resp., on the 240
tool specimens compared. A modified guaiac test
Hemoccult®) exhibited a false-positive rate of
2%. Of the 27 patients entering the study due
o positive guaiac or orthotolidine screening
ests, 17 (63%) were not bleeding. Modified
uaiac, approximately one-fourth as sensi-
ive as guaic and orthotolidine, could miss
esions with low rates of bleeding unless multiple
tools were tested. While barium had no effect,
ron therapy or laxatives tended to lower both
alse-positive and false-negative reactions for all
eagents. A positive modified guaiac test usually
ndicated significant gastrointestinal bleeding and
ppears to be the test of choice, provided at least
hree stools are tested to minimize false-negative
esults.

165 THE APPLICATION OF ENDOSCOPIC LUGOL'S SOLUTION SPRAYING METHOD FOR THE DIAGNOSIS
THE ESOPHAGITIS (FOR THE FOLLOW-UP OBSERVATION OF
UTE SEVERE ESOPHAGITIS).

(Eng.) Akasaka, Y.;
imoto, K.; Kawai, K.; Toriie, S.; Okuda, J.; Kubato,
; Ida, K. (Kyoto Prefectural Univ. Medicine, Kyoto,
apan). *Endoscopy* 8(3):142-146; 1976.

e endoscopic Lugol spraying method was used to
udy the healing process of acute severe esophagitis
148 patients. During acute esophagitis, endoscopy
evealed diffuse erosion or ulceration and scattered
ongested hemorrhagic areas in the lower third of the
sophagus. Normal areas had a "fine wrinkle" surface
attern. The lesions stained light yellow with
ugol, whereas normal areas were dark brown. The
egree of healing could be estimated by the recovery
staining in the affected areas. Healing began
ithin 14 days, when small epithelial islets with
rregular "fine wrinkles" appeared. Complete healing
as observed between 3 and 9 weeks.

166 EVALUATION OF THE INTRAEPITHELIAL LYMPHOCYTE COUNT IN THE JEJUNUM IN CHILDHOOD
TEROPATHIES.

(Eng.) Mavromichalis, J.; Brueton,
J.; McNeish, A. S.; Anderson, C. M. (Inst. Child
ealth, Univ. Birmingham, Birmingham, England). *Gut*
(8):600-603; 1976.

erial changes in the intraepithelial lymphocyte
ounts of children with a small intestinal entero-
athy were determined in 131 jejunal mucosal biopsies.
e small intestinal enteropathies arose from a varie-
of causes, including celiac disease (untreated, after gluten withdrawal, and during subsequent challenge), giardiasis, cow's milk protein intolerance, and "intractable diarrhea." The counts were compared with those from the biopsies of 29 children referred for investigation, but without gastrointestinal disease, and of 34 healthy siblings of children with celiac disease. The mean count of 12 children with untreated celiac disease (68 ± 19/100 epithelial cells) was significantly greater than that in the two normal groups (15 ± 4 and 17 ± 8/100 cells, resp., $p<0.001$), and the count dropped in the celiac patients after gluten withdrawal (25 ± 4/100 cells). Lymphocytic infiltration of the epithelium increased rapidly during gluten challenge in such children, while no change was seen in those children proven ultimately not to have celiac disease. In the other enteropathies, the range of counts was wide, overlapping with both normal and celiac groups and indicating the nonspecificity of lymphocytic infiltration of the gut epithelium. The results demonstrate that lymphocyte infiltration of the jejunal epithelium is increased in both adults and children with untreated celiac disease.

2167 A DOUBLE BLIND CROSSOVER STUDY OF METOCLOPRAMIDE VERSUS PLACEBO FOR FACILITATING PASSAGE OF MULTIPURPOSE BIOPSY TUBE.

(Eng.) Christie, D. L.; Ament, M. E. (Children's Orthopedic Hosp. and Medical Center, Seattle, WA). *Gastroenterology* 71(5):726-728; 1976.

The value of metoclopramide (M) in facilitating the passage of a multipurpose biopsy tube and capsule into the small intestine was investigated in a double blind, crossover study in 34 subjects. Five subjects withdrew from the study after one intubation. M (10 mg, i.v.) decreased intubation time to a mean of 10.4 ± 1.5 min ($p<0.05$) in 20 volunteers who were successfully intubated to the ligament of Treitz after both M and placebo (sodium metabisulfite, 2 ml); the intubation time after the administration of placebo was 16.8 ± 1.7 min. Of the remaining nine subjects who could be intubated, eight were intubated to the ligament of Treitz after M, but not after placebo ($p<0.01$). Among the 29 intubated volunteers, 22 were successfully intubated by 15 min when M was given, but only 9 of the 29 could be intubated in 15 min with placebo ($p<0.001$). Nine subjects experienced minor side-effects after receiving M. This study demonstrates that M is superior to placebo in decreasing the intubation time of a small intestinal biopsy capsule and is primarily useful in patients who may not otherwise be successfully intubated.

2168 THE NEONATAL COLON: AN ANATOMIC APPROACH TO PLAIN FILMS.

(Eng.) Kleinman, P. K.; Winchester, P.; Meyers, M. A.; Abbott, G. (Natl. Naval Medical Center, Bethesda, MD 20014). *Am. J. Roentgenol.* 128(1):61-64; 1977.

Factors involved in the identification of the neonatal colon in plain films are reviewed, and approaches to colon identification were applied in a retrospective examination of the plain abdominal films of eight cases of known distal colonic obstruction in newborns. It has been confirmed that haustral folds are well developed at birth; in one study, colonic haustrations were demonstrated in 81 of 105 neonates by barium enema examination. Prominent haustrations are evident in the transverse colon and, to a lesser extent, in the descending colon. Identification of the colon can be further enhanced if a gas-filled loop of bowel can be recognized within a characteristic course and relationship to other abdominal structures. Using these two criteria of colon identification, the colon was clearly identified on three of five cases of imperforate anus and in two of three cases of Hirschsprung's disease. Colon identification was most likely if abdominal films in multiple projections were obtained with the onset of abdominal distension. With progressive distension and atony of large and small bowel, confusing superimposition of shadows occurred. However, it is apparent that colonic gas can be identified in a significant number of infants with low colonic obstruction.

2169 FIBEROPTIC ENDOSCOPY AND UPPER GASTROINTESTINAL SERIES: COMPARATIVE ANALYSIS IN INFANTS AND CHILDREN. (Eng.) Gyepes, M. T.; Smith, L. E.; Ament, M. E. (Univ. California Sch. Medicine, Los Angeles, CA 90024). *Am. J. Roentgenol.* 128(1): 53-56; 1977.

The results of fiberoptic endoscopy were compared with those of upper gastrointestinal series in 75 infants and children. Agreement between the two studies was obtained in 49 cases (65.3%) and disagreement, in 26 (34.6%). The original radiologic reports were negative, but the endoscopic reports were positive in 17 cases (22.6%), while the converse was true in 9 cases (12%). Superficial lesions in the esophagus, stomach, and duodenum were most often missed by conventional barium studies, while false-positive radiologic reports occurred in the duodenum. There were only two minor complications, both mucosal tears, which did not require surgery; both appeared to occur because of inadequate sedation. The results suggest that fiberoptic endoscopy is a more accurate tool in the diagnosis of superficial mucosal lesions in children than conventional barium studies. However, the high rate of detection of nonsuperficial lesions by radiographic methods is encouraging.

2170 ASSESSMENT OF THE ACCURACY OF DOUBLE CONTRAST GASTRODUODENAL RADIOLOGY. (Eng.) Laufer, I. (Hosp. Univ. Pennsylvania, 34th and Spruce St., Philadelphia, Pa 19104). *Gastroenterology* 71 (5):874-878; 1976.

The accuracy of routine double contrast gastroduodenal radiology, based on experience with 1,500 consecutive examinations was assessed. The value of this technique was illustrated by the demonstration of subtle abnormalities, such as erosions, linear ulcers, and ulcer scars, which are usually not demonstrated by the standard barium study. Two hundred twenty-five of these patients were also examined by endoscopy; radiological errors were found in 7%. This represents a marked improvement over the standard barium study in which errors may occur in 18-33% In the last 128 patients, a confidence level ranging from 3 (certainty) to 1 (uncertain) was assigned to the radiological diagnosis before endoscopy. The majority of radiological errors occurred in the few studies given the lowest confidence level. These fin ings indicate that the double contrast study of the stomach and duodenum can be a very accurate examination and that endoscopy can be applied more selectively to patients with inconclusive double contrast studies.

2171 LINEAR AND ROD-SHAPED PEPTIC ULCERS. (Eng.) Poplack, W.; Paul, R. E., Jr.; Goldsmith, M.; Matsue, H.; Bloom, S.; Moore, J. P.; Norton, R. A. (New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Radiology* 122(2):317-319; 1977.

The results of approximately 1,500 upper gastrointestinal series performed by the pharmacologically-aided, double-contrast technique were reviewed to demonstrate that active and healing ulcers can be diagnosed by this technique. Peptic ulcers were divided into one of six classifications, according to shape and size (i.e., tiny, linear, rod, ovoid, round, and irregular). During a 6-month period, 13 linear and rod-shaped ulcers were observed. Gastric relaxation and good mucosal coating were necessary to detect ulcers of this shape. Linear ulcers were found to occur both as initial ulcer forms and a stages in healing of ulcers that started as irregular, round, or ovoid forms. Several illustrations are presented. The results demonstrated that no particular clinical manifestations could be attributed to linear ulcers or other specific ulcer forms.

2172 HEPATIC ABSCESS: DIAGNOSIS IN THE ADULT BY TOTAL BODY OPACIFICATION. (Eng.) Morin, M. E.; Baker, D. A.; Marsan, R. E. (Veterans Admin. Lakeside Hosp., 33 E. Huron St., Chicago, IL 60611). *JAMA* 236(14):1607-1608; 1976.

The cases of two patients in whom hepatic abscesses were demonstrated by total body opacification (TBO) are presented. The first patient, a 55-yr-old man, presented with a 1-month history of diarrhea, anorexia, malaise, and increasing abdominal girth. A ^{99m}Tc sulfur colloid liver scan showed a focal defect in the posterosuperior aspect of the right lobe, and a ^{67}Ga scan suggested either an abscess or a hepatoma. A routine preoperative excretory urogram was modified to include tomograms of the liver during the TBO phase. The lesion was shown to be hypovascular, suggesting an abscess, and this was confirmed by B-mode gray-scale ultrasonography. The serum hemagglutination for *Entamoeba histolytica* was strongly positive, and the symptoms resolved in response to metronidazole therapy. The second patient, a 46-yr-old man, presented with right flank and upper right quadrant pain, nausea, vomiting, and fever. The TBO phase of an excretory urogram showed a multiloculated, thick-walled intrahepatic lucency, which was diagnosed preoperatively as an abscess. The abscess replaced 20% of the right lobe, and pus cultures grew *Fusobacter-*

ium nucleatum and *Peptostreptococcus micros*. TBO is helpful in the preoperative diagnosis of abdominal masses.

2173 A COMPARISON OF ANGIOGRAPHY AND SCINTIGRAPHY AS DIAGNOSTIC METHODS FOR AMEBIC LIVER ABSCESS. (Eng.) Lundberg, Y. (Roslagstulls sjukhus, Box 5901, S-114 89 Stockholm, Sweden). *Scand. J. Infect. Dis.* 8(4):263-265; 1976.

Angiography was compared with scintigraphy in the diagnosis of amebic liver abscess in 12 patients with amebiasis. In five patients, scintigraphy indicated a liver abscess; this diagnosis was supported by colloidal radioactive gold isotope angiography in three patients. The abscess was seen in the scintigram as a defect in the radionuclide uptake of the liver and in the angiogram, as an area devoid of vessels and of defective contrast loading. Although the number of patients is too small to draw definite conclusions, scintigraphy may be slightly superior to angiography in the diagnosis of amebic liver abscesses.

2174 GRAY SCALE ULTRASONIC CHOLECYSTOGRAPHY: A COMPARISON WITH CONVENTIONAL RADIOGRAPHIC TECHNIQUES. (Eng.) Leopold, G. R.; Amberg, J.; Gosink, B. B.; Mittelstaedt, C. (Univ. Hosp., 225 W. Dickinson St., San Diego, CA 92103). *Radiology* 121(2):445-448; 1976.

A prospective study was carried out to assess the accuracy of gray scale ultrasonography in the evaluation of cholelithiasis. One hundred eleven patients with nonvisualization on first-day p.o. cholecystography underwent ultrasonic cholecystography, and the results were compared with subsequent second-day visualization or surgical findings. Among 75 patients in whom sufficient data were present to assess the accuracy of the method (i.e., satisfactory second-day cholecystogram or surgical evidence), ultrasound correctly diagnosed gallstones in 68. Gallstones were identified as single- or multiple-echo dense structures lodged in the most dependent portion of the gallbladder. Shadowing was often the key feature that allowed the detection of biliary calculi, and this effect was obvious only when a sectoring technique was used to perform the scan. Only six gallbladders could not be visualized ultrasonically, and all subsequently proved to contain gallstones. Twenty-four of the 75 patients had inadequate radiographic visualization. Among the 52 patients with adequate radiographic visualization, 32 were considered to have normal gallbladders; in 31 of these, ultrasound was also normal. The remaining case was considered to be a false-positive ultrasonographic diagnosis. The overall accuracy of ultrasonic cholecystography was 91%. It is concluded that improved ultrasonic technique is of considerable value in investigating the nonvisualized gallbladder.

2175 HEPATOSCINTIGRAPHY, ARTERIOGRAPHY, AND ULTRASONOGRAPHY IN PREOPERATIVE DIAGNOSIS OF CHOLEDOCHAL CYST. (Eng.) Piyachon, C.; Poshyachinda, M.; Dhitavat, V. (Chulalongkorn Hosp., Bangkok, Thailand). *Am. J. Roentgenol.* 127(3):520-523; 1976.

The case of a 32-yr-old woman in whom a choledochal cyst was correctly diagnosed preoperatively by hepatoscintigraphy, arteriography, and ultrasonography is presented. The patient presented with a 20-day history of jaundice, abdominal pain, fever, and an abdominal mass. The upper gastrointestinal examination showed an extrinsic pressure effect on the body of the stomach, with displacement to the left and caudal, and barium enema examination demonstrated depression of the hepatic flexure and proximal transverse colon. Liver scintigraphy with ^{198}Au showed marked enlargement of the liver, with a large space-occupying lesion in the anteromedial aspect of the right lobe and another smaller defect in the left lobe. Abdominal aortography and celiac, superior mesenteric, and selective hepatic arteriography established that the lesion was cystic, rather than a malignancy. These techniques demonstrated anterior displacement, stretching, and elongation of the common hepatic and gastroduodenal arteries. The right hepatic artery was elevated and stretched. Due to marked dilatation of the hepatic ducts secondary to impacted stones, the displacement of hepatic arterial branches and lucencies in the parenchymal phase were markedly prominent. Findings on B-mode ultrasonography correlated well with the angiographic findings in the demonstration of the cyst and dilated hepatic ducts. Accumulation of radioactivity in delayed scintigram with the use of ^{131}I rose bengal indicated that the lesion was a bile-containing structure. Complementary information from these studies is helpful in the diagnosis of choledochal cyst. The demonstration of a sonolucent mass in the epigastrium with small cystic lesions in the liver is suggestive of the diagnosis.

2176 FALSE-POSITIVE LIVER SCAN CAUSED BY ANOMALOUS QUADRATE LOBE AND RIGHT PORTAL BRANCH. (Eng.) Suzuki, K.; Okuda, K.; Musha, H.; Nakajima, Y.; Kimura, K.; Kuniyasu, Y. (Chiba Univ. Sch. Medicine, Chiba City [280], Japan). *Acta Hepatogastroenterol.* 24(1):27-29; 1977.

The case of a patient with a false-positive liver scan caused by anatomical abnormalities and dilatation of the right portal branch is presented. The patient, a 44-yr-old man, had hepatomegaly, splenomegaly, spider angiomata, and abnormal liver function tests. A ^{99m}Tc-phytate liver scan demonstrated a clearly demarcated defect in the hilar area along the inferomedial edge of the right lobe. Laparoscopy revealed a tongue-like protrusion in the inferior surface of the quadrate lobe to the left of the gallbladder bed. Percutaneous transhepatic portography showed an anomalous division of the portal vein and moderate dilatation of the right portal branch.

2177 DIAGNOSTIC VALUE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN BILIODIGESTIVE ANASTOMOSES. (Eng.) Papp, J.; Tulassay, Z.; Bielawski, J.; Hajos, E.; Kollin, E.; Pfeiffer, I. (Semmelweis Univ. Medical Sch., H-Budapest, Hungary). *Acta Hepatogastroenterol.* 24(1):41-43; 1977.

The diagnostic value of endoscopic retrograde cholangiopancreatography (ERCP) in biliodigestive anastomoses was studied in 62 patients. In 54 patients, ERCP was carried out to clarify the abnormality underlying biliary obstruction. In the majority of cases, opacification was carried out via the stoma (51 patients); catheterization of the papilla was also necessary in 25 cases. The bile duct was visualized in 55 cases, and the pancreatic duct was seen in 21 cases. Catheterization was unsuccessful in two cases. ERCP revealed a pathological finding in 75% of the patients. ERCP appears to be a reliable diagnostic method in patients with biliodigestive anastomosis.

2178 THE SIGNIFICANCE OF PANCREATIC DUCTAL OBSTRUCTION IN DIFFERENTIAL DIAGNOSIS OF THE ABNORMAL ENDOSCOPIC RETROGRADE PANCREATOGRAM.

(Eng.) Rohrmann, C. A., Jr.; Silvis, S. E.; Vennes, J. A. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Radiology* 121(2):311-314; 1976.

Fifty pancreatograms showing incomplete opacification of the pancreatic duct in patients with proved pancreatic status were reviewed to gain information on the differential diagnosis of the wide variety of pancreatic diseases showing this abnormality. Seven patients had normal pancreatic function. The final diagnosis in the remaining patients was pseudocyst in 15, neoplasm in 15, chronic pancreatitis in 8, acute recurrent pancreatitis in 3, and abscess in 2. The site of obstruction among the patients with pseudocyst occurred most commonly in the pancreatic head and body (87%). When the point of termination was visualized, it usually had no specific character. In 25% of the cases, the terminus was not visualized, usually being obscured by the cyst. All pseudocysts were greater than 2 cm in diameter. In the patients with a neoplasm, the terminus was tapered, destructive irregular, or eccentric in 73% and nonspecific or blunt in the remainder. The site of obstruction was most commonly in the pancreatic head and to the right of the spine (60%). In the patients with a normal pancreas, the terminus was uniformly nonspecific and occurred at the point where the duct traverses the spine. Obstruction occurred most commonly in the body and tail (87%) in patients with chronic pancreatitis; the point of termination was uniformly blunt or nonspecific. The results suggest that the differential diagnosis of abnormal endoscopic retrograde pancreatograms is facilitated by accurate evaluation of the ductal and extraductal characteristics, particularly the ductal detail at the point of termination.

2179 INCREASED PANCREATIC VOLUME IN FRONTAL RADIOGRAPHY OF THE STOMACH.

(Por.) Parra, O. M.; Saad, W. A.; Gutierez, F. (Clin. Cir., Hosp. Munic. do Tatuape, Tatuape, SP, Brazil). *Rev. Assoc. Med. Bras.* 21(8):245-247; 1975.

The diagnostic value of frontal radiography of the stomach in the detection of increased pancreatic volume was analyzed retrospectively using radiographs of eight patients with clinically confirmed pancreatic pseudocysts (6), chronic pancreatitis (1), and cancer of the head of the pancreas (1). Classic radiological signs of pancreatic enlargement were not detected at the initial examination, except in one patient with large pseudocysts of the head and tail of the pancreas. This patient showed radiological signs of compression, which were diagnosed as gastric polyps and not even mentioned in the radiological report. Re-examination of the radiographs showed no signs of dislocation or compression in five patients, including one with large tumor of the pancreas. The remaining three patients showed central compression images of variable size and shape. These usually had vague outlines and were located on a clear background; darkening of the gastric folds was noted, probably due to the distention of the mucosa. A more accurate analysis of frontal radiographs of the stomach may result in a better detection of pancreatic enlargements. Radiography in dorsal decubitus--with barium or double contrast--gives much better results than frontal radiography.

2180 DIAGNOSTIC ACCURACY OF FIBEROPTIC PANENDOSCOPY AND VISCERAL ANGIOGRAPHY IN ACUTE UPPER GASTROINTESTINAL BLEEDING.

(Eng.) Butler, M. L.; Johnson, L. F.; Clark, R. (Letterman Army Medical Center, San Francisco, CA). *Am. J. Gastroenterol.* 65(6):501-511; 1976.

2181 STUDIES ON THE FIBERCOLONOSCOPY: WITH SPECIAL REFERENCE TO THE LATEST PROCEDURES.

(Eng.) Watanabe, H.; Narasaka, T.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 117(4):385-396; 1975.

2182 AMYLASE--ITS CLINICAL SIGNIFICANCE: A REVIEW OF THE LITERATURE.

(Eng.) Salt, W. B., II; Schenker, S. (Nashville Veterans Admin. Hosp., Nashville, TN). *Medicine* 55(4):269-289; 1976.

2183 ROLE OF GASTRIN DETERMINATIONS IN CLINICAL SURGERY.

(Eng.) Stremple, J. F.; Elliott, D. W. (Veterans Admin. Hosp., University Dr. C, Pittsburgh, PA 15240). *Am. Surg.* 42(2):102-107; 1976.

2184 FACTORS DETERMINING PRESSURE MEASUREMENT ACCURACY BY INTRALUMINAL ESOPHAGEAL MANOMETRY.

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See also, 1927, 1965, 2023, 2024, 2223, 2237, 2241, 2252, 2253, 2254, 2266, 2314, 2319, 2320, 2329, 2343, 2344, 2346, 2358, 2370, 2371, 2372, 2373, 2386, 2394, 2395, 2396, 2410, 2411, 2414, 2424, 2429, 2430, 2434, 2435, 2445, 2454, 2459, 2537, 2566, 2568, 2578, 2581, 2602, 2607, 2614, 2618, 2662.

GASTROINTESTINAL DISEASES

ESOPHAGUS

2223 VALUE OF ESOPHAGEAL MANOMETRIC STUDIES IN THE GASTROESOPHAGEAL REFLUX OF INFANCY. (Eng.) Euler, A. R.; Ament, M. E. (Univ. California Sch. Medicine, Los Angeles, CA 90024). *Pediatrics* 59(1):58-61; 1977

Esophageal manometric studies were carried out in 15 infants with symptoms of gastroesophageal reflux (GER) to determine if these procedures are helpful in identifying patients who require surgery. The symptoms included chronic postprandial vomiting, beginning during the first 7 days of life. Esophagograms were carried out in 14 infants; hiatal hernia was diagnosed in 2, reflux in 4, and stricture in 1. Esophagoscopy in eight subjects revealed spontaneous friability of the lower third of the esophagus in three infants and stricture in one; all patients with friability or stricture had histological documentation of esophagitis. All infants were placed on a regimen of frequent thickened feedings and were kept in an upright position 24 hr per day for 3 weeks. Nissen fundoplications were performed in the six infants who did not respond to this treatment. Their mean lower esophageal sphincter pressure was 12.7 mm Hg, while that of the nine infants who did well on the medical regimen was 19.6 mm Hg ($p < 0.001$). The results suggest that esophageal manometric studies should be included in the evaluation of all infants with symptoms of chronic GER.

2224 STIMULATORY EFFECT OF METOCLOPRAMIDE ON THE ESOPHAGUS AND LOWER ESOPHAGEAL SPHINCTER OF PATIENTS WITH PSS. (Eng.) Ramirez-Mata, M.; Ibanez, G.; Alarcon-Segovia, D. (Instituto Nacional de la Nutricion, Av. San Fernando y Viaducto Tlalpan, Mexico 22, D.F., Mexico). *Arthritis Rheum.* 20(1): 30-34; 1977.

Because metoclopramide has been shown to stimulate gastrointestinal motility, the effect of i.v. metoclopramide (20 mg) on the sphincter pressure and esophageal motility were tested in 14 patients with esophageal dysfunction due to progressive systemic sclerosis (PSS). Isotonic saline similarly injected in a control period in seven patients showed no effect. None of the patients had a detectable pressure zone at the sphincteric area in basal conditions, but a pressure zone appeared in seven patients after metoclopramide injection. Metoclopramide also caused the appearance of pressure waves in 5 of 11 patients who had aperistalsis, and caused up to a threefold increase in the amplitude of the pressure waves in the 3 patients who had hypomotility of the esophagus. Because metoclopramide can be used p.o., it may be helpful for the relief of both dysphagia and acid regurgitation.

2225 GANGLION CELLS IN ACHALASIA OF THE CARDIA. (Eng.) Adams, C. W. M.; Brain, R. H. F.; Trounce, J. R. (Guy's Hosp. Medical Sch., London SE1 9RT, England). *Virchows Arch.* [*Pathol. Anat.*] 372(1):75-79; 1976.

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2236 ESOPHAGEAL DYSFUNCTION IN SCLERODERMA [Abstract]. (Eng.) Matarazzo, S. A.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 23(4):482A; 1975.

See also, 1829, 2165, 2184, 2261, 2276, 2280, 2614, 2636.

STOMACH

2237 INTRAMURAL GASTROINTESTINAL HEMORRHAGE: CLINICAL AND RADIOGRAPHIC MANIFESTATIONS. (Eng.) Balthazar, E. J.; Einhorn, R. (New York Medical Coll.-Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10029). *Gastrointest. Radiol.* 1(3):229-239; 1976.

The clinical and radiographic manifestations of intramural gastrointestinal hemorrhage, based on the analysis of 20 cases affecting different segments of the gastrointestinal tract, are presented, together with a review of the literature. The pathologic process is induced principally by anticoagulant therapy, bleeding diathesis, or abdominal trauma and occurs as a localized, well-defined, intramural mass or as a more diffuse segmental involvement. The clinical features are nonspecific and can vary from mild crampy abdominal pain to severe shock. Other manifestations include rebound tenderness, muscle guarding, and small bowel obstruction. The duodenum and small bowel are the most frequent sites of involvement. The intestinal mucosal folds may be prominent, stretched, and sharply defined or completely effaced, accompanied by a smooth narrowing. There is rapid clinical and radiographic remission with conservative therapy. Intestinal perforations and fibrotic strictures resulting in small bowel obstruction are rare, being observed only in the post-traumatic variety.

2238 ANTRAL GASTRIN CONCENTRATION IN PATIENTS WITH VAGOTOMY AND PYLOROPLASTY. (Eng.) Hughes, W. S.; Hernandez, A. J. (Univ. Texas Medical Branch, Galveston, TX 77550). *Gastroenterology* 71(5):720-722; 1976.

To determine whether an increase in antral gastrin concentration could be a factor in postvagotomy hypergastrinemia, antral gastrin concentration was measured in endoscopic forceps biopsy specimens of prepyloric mucosa in patients with vagotomy and pyloroplasty, duodenal ulcer patients, and nonulcer patients. The antral gastrin concentration in vagotomy and pyloroplasty patients (35.5 ± 4.1 ng gastrin/mg tissue), was significantly greater ($p<0.01$) than the antral gastrin concentration in duodenal ulcer patients (13.0 ± 2.4 ng/mg), and that in controls (14.8 ± 3.1 ng/mg). Basal and meal-stimulated serum gastrin levels in vagotomy and pyloroplasty patients were also significantly greater ($p<0.05$) than gastrin levels in either duodenal ulcer patients or controls. Acid secretion rates were not significantly correlated with serum or antral gastrin concentrations in the patient groups. The finding of high antral gastrin concentration in patients with vagotomy and pyloroplasty is consistent with the hypothesis that a high concentration of tissue gastrin accounts, at least in part, for the high serum gastrin levels. The rate of gastrin synthesis, as well as the rate of gastrin release, is increased in these patients.

2239 GASTRIC CARCINOID WITH ECTOPIC PRODUCTION OF ACTH AND β-MSH. (Eng.) Hirata, Y.; Sakamoto, N.; Yamamoto, H.; Matsukura, S.; Imura, H.; Okada, S. (Kobe Univ. Sch. Medicine, Kusunoki-cho, Ikuta-ku, Kobe 650, Japan). *Cancer* 37(1):377-385; 1976.

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2243 GASTROCOLIC FISTULA AS A COMPLICATION OF CARCINOMA OF THE LUNG. (Eng.) Thal, E. R. Lockwood, T. E. (Univ. Texas Southwestern Medical

Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *JAMA* 235(9):934-935; 1976.

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2257 GASTRIN LEVELS OF THE SERUM AND ANTRAL MUCOSA IN SUBJECTS WITH ANTRAL GASTRIN CELL HYPERPLASIA ASSOCIATED WITH HYPER-NORMOCHLORHYDRIA [Abstract]. (Eng.) Tomassetti, P.; Vezzandini, P.; Cipollini, F.; Cavicchi, A.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):248; 1975.

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2260 RADIOGRAPHIC FEATURES OF GASTRIC POLYPS IN FAMILIAL ADENOMATOSIS COLI. (Eng.) Itai, Y.; Kogure, T.; Okuyama, Y.; Muto, T. (Faculty Medicine, Univ. Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo, Japan). *Am. J. Roentgenol.* 128(1):73-76; 1977.

2261 SYMPTOMATIC GASTROESOPHAGEAL REFLUX: INCIDENCE AND PRECIPITATING FACTORS. (Eng.) Nebel, O. T.; Fornes, M. F.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *Am. J. Dig. Dis.* 21(11):953-956; 1976.

2262 SPONTANEOUS RUPTURE OF STOMACH IN NEONATE. (Eng.) Blumberg, M. L.; Khayat, E. (Jamaica Hosp., 89th Ave. & Van Wyck Expressway, Jamaica, NY 11418). *N.Y. State J. Med.* 76(13): 2184-2186; 1976.

2263 ULCER FORMATION AND HISTOCHEMICAL CHANGES IN RAT-STOMACH MUCOSA INDUCED BY ACETYLSALICYLIC ACID. (Eng.) Glarborg Jorgensen, T. (Inst. Experimental Res. Surgery, Univ. Copenhagen, 71, Norre Alle, 2100 Copenhagen ϕ, Denmark). *Acta Pathol. Microbiol. Scand* [*A*] 84(1):64-72; 1976.

2264 VAGAL AND HORMONAL INFLUENCES ON GASTRIC SECRETION IN DUODENAL ULCER DISEASE. (Eng.) Konturek, St. J. (Inst. Physiology, ul. Grzegorzecka 16, 31-531 Krakow, Poland). *Klin. Wochenschr.* 54(19):903-910; 1976.

2265 MAXIMUM ACID OUTPUT AND RISK OF PEPTIC ULCERS. (Eng.) Fiddian-Green, R. G.; Marks, I. N.; Bank, S.; Louw, J. H. (Univ. Hosp., Ann Arbor, MI 48109). *Lancet* 2(8000):1367-1369; 1976.

2266 MAXIMUM ACID OUTPUT AND POSITION OF PEPTIC ULCERS. (Eng.) Fiddian-Green, R. G.; Marks, I. N.; Bank, S.; Louw, J. H. (Univ. Hosp., Ann Arbor, MI 48109). *Lancet* 2(8000):1370-1373; 1976.

2267 STRESS ULCERS: THEIR PATHOGENESIS, DIAGNOSIS, AND TREATMENT. (Eng.) Moody, F. G.; Cheung, L. Y. (Univ. Utah Medical Center, Salt Lake City, UT 84132). *Surg. Clin. North Am.* 56(6):1469-1478; 1976.

2268 MODIFICATION OF PORCINE STRESS ULCERATION BY METHYLPREDNISOLONE, VITAMIN A AND METHYSERGIDE TREATMENT. (Eng.) Kivilaakso, E.; Kalima, T. V.; Lempinen, M. (Univ. Central Hosp., Haartmaninkatu 4, SF-00290 Helsinki 29, Finland). *Eur. Surg. Res.* 8(4):281-288; 1976.

2269 EFFECT OF GLUCAGON ON ASPIRIN-INDUCED GASTRIC MUCOSAL DAMAGE IN MAN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J.; Krause, W.; Baskin, W. N. (Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(1):51A; 1977.

2270 EFFECTS OF L-GLUTAMINE ON VARIOUS GASTRIC LESIONS IN RATS AND GUINEA PIGS. (Eng.) Okabe, S.; Takeuchi, K.; Takata, Y.; Naganuma, T.; Takagi, K. (Faculty Pharmaceutical Sciences, Univ. Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113, Japan). *Digestion* 14(4):325-331; 1976.

2271 SERUM GASTRIN LEVELS DURING PROPRANOLOL ADMINISTRATION [Abstract]. (Eng.) Blasi, A.; Catalano, F. (Cattedra di Gastroenterologia dell'Universita, Catania, Italy). *Rend. Gastroenterol.* 7(3):248; 1975.

2272 THE EARLY EFFECT OF TRIMIPRAMINE (SURMONTIL) ON GASTRIC SECRETION IN MAN. (Eng.) Myren, J.; Berstad, A. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(8):817-819; 1975.

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2274 SECRETORY AND HORMONAL CELLS OF THE STOMACH FOLLOWING RESECTION OF GASTRIC MUCOSA IN THE ANTRAL REGION. (Rus.) Uspenskii, V. M (I. P. Pavlov Inst. Physiology, USSR Acad. Sciences, Leningrad, USSR). *Fiziol. Zh. SSSR* 62(1):140-142; 1976.

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2276 THE EFFECT OF POSTURE ON THE EMPTYING OF THE INTRATHORACIC VAGOTOMIZED STOMACH. (Eng.) Hinder, R. A. (Johannesburg Hosp., Johannesburg, South Africa). *Br. J. Surg.* 63(8):581-584; 1976.

2277 THE DOUBLE PYLORUS. (Eng.) Bennike, S.; Hegedus, V. (Glostrup Hosp., Copenhagen, Denmark). *Br. J. Radiol.* 49(577):90-92; 1976.

2278 THE ROLE OF THE PYLORIC ANTRUM AND HOFMEISTER VALVE IN THE DEVELOPMENT OF THE CHRONIC GASTRIC MUCOSAL REACTION. (Eng.) Lawson, H. H. (Baragwanath Hosp., Johannesburg, South Africa). *Br. J. Surg.* 63(8):592-595; 1976.

2279 RECOGNIZING CONGENITAL PYLORIC MUCOSAL DIAPHRAGM IN THE ELDERLY. (Eng.) Dorsch, E. R.; O'Neil, F. S.; Grahm, D. Y. (Baylor Coll. Medicine, 1200 Moursund Ave., Houston, TX 77030). *Geriatrics* 31(10):110-112; 1976.

See also, 1751, 1763, 1792, 1823, 1870, 1877, 1878, 1882, 1915, 1918, 1919, 1920, 2107, 2113, 2138, 2141, 2142, 2143, 2144, 2146, 2147, 2148, 2169, 2170, 2175, 2183, 2185, 2193, 2222, 2223, 2225, 2229, 2233, 2234, 2297, 2306, 2310, 2317, 2410, 2589, 2601, 2611, 2614, 2649.

Peptic Ulcers

2280 ENDOSCOPIC ELECTROCOAGULATION OF UPPER GASTROINTESTINAL HEMORRHAGE. (Eng.) Papp, J. P. (2500 Oakwood Drive S.E., Grand Rapids, MI 49506). *JAMA* 236(18):2076-2079; 1976.

The results of endoscopic electrocoagulation performed on 40 occasions in 38 patients, with bleeding gastrointestinal lesions, are presented. Cessation of bleeding was achieved in 95%. Fifteen gastric ulcers, 14 duodenal ulcers, 6 Mallory-Weiss tears, 1 gastric varix, 1 hemorrhagic antral gastritis, and 1 esophageal ulcer were successfully electrocoagulated. Three duodenal and three gastric ulcers rebled. One duodenal ulcer and one gastric ulcer were successfully reelectrocoagulated. Failure to stop bleeding by electrocoagulation occurred in one Mallory-Weiss tear and one duodenal ulcer. There was no morbidity or mortality attributed to endoscopic electrocoagulation. A retrospective cost analysis showed that the cost of hospitalization was less in patients treated by electrocoagulation. Patients so treated were hospitalized 1.5 days longer than surgically treated patients with bleeding, but less than patients treated medically. This series suggests that endoscopic electrocoagulation should be used in bleeding gastrointestinal lesions and that surgery should be carried out only if this technique fails to achieve hemostasis.

281 A REPRODUCIBLE ANIMAL MODEL OF ACUTE BLEEDING ULCER--THE "ULCER MAKER." (Eng.) rotell, R. L.; Silverstein, F. E.; Piercey, J.; ennis, M.; Sprake, W.; Rubin, C. E. (Dept. Medicine, niv. Washington, Seattle, WA 98195). *Gastroenterology* 71(6):961-964; 1976.

multipurpose suction biopsy tube that has been modfied to make acute gastric ulcers by enlarging the apsule and its biopsy orifice is described, and the iameter and depth of experimental ulcers made with his instrument in dogs were standardized. The rate f bleeding, with and without heparinization, was also valuated. The most reproducible ulcers, in terms of ize and degree of bleeding, were obtained from the undal gland area (as opposed to the antrum) at -14 ches Hg suction held for 1 sec, using an 8.1-mm diaeter internal obturator. All 58 ulcers made in this anner in eight mongrel dogs extended into the submusa, but not into the muscularis externa. The ulcers easured 9.38 ± 1.27 mm in diameter and 1.54 ± 0.31 mm depth. Five of twelve gastric ulcers in unheparized dogs stopped bleeding spontaneously. The rate bleeding was variable during the first 3 min in parinized dogs (range, 0.3-22.4 ml), but 33 of the ulcers had an initial 3-min bleeding rate between and 9 ml. These ulcers could be classified accordg to their initial 3-min bleeding rate into three tegories: mild (<3 ml, 15 ulcers), moderate -<6 ml, 22), and severe (>6 ml, 21). During min observation of 16 ulcers, bleeding rate deeased spontaneously a median of 55%. No ulcer opped bleeding during a 70-min observation period. ing this model, nonsurgical modalities for the treatment of upper gastrointestinal bleeding can be compared in a controlled manner.

2282 EFFECTS OF ETHYL ALCOHOL ON THE ADENOSINE 3', 5'-MONOPHOSPHATE SYSTEM OF THE HUMAN GASTRIC MUCOSA. (Eng.) Karppanen, H.; Puurunen, J.; Kairaluoma, M.; Larmi, T. (Dept. Pharmacology, Univ. Oulu, SF-90 220 Oulu 22, Finland). *Scand. J. Gastroenterol.* 36(4):603-607; 1976.

In vitro studies were carried out to determine whether the cyclic AMP system is involved in the changes of gastric acid secretion induced by different concentrations of p.o. ethyl alcohol in man. Gastric mucosa was obtained from patients operated on for gastric or duodenal ulcers. Five percent ethanol (volume/volume) or less stimulated the activity of adenylate cyclase and induced a dose-dependent rise of the gastric mucosal content of cyclic AMP. However, 10% ethanol increased the activity of adenylate cyclase, but did not affect the gastric mucosal content of cyclic AMP. Five or ten percent ethanol inhibited the activity of cyclic AMP phosphodiesterase in a competitive manner. Reports in the literature indicate that p.o. ethanol stimulates the output of gastric acid at low, but not at higher, concentrations; the present results are consistent with the concept that the stimulatory effect of ethanol on the output of acid is mediated by an increase of the content of cyclic AMP in the gastric mucosa.

2283 ANTACID AND PLACEBO PRODUCED SIMILAR PAIN RELIEF IN DUODENAL ULCER PATIENTS. (Eng.) Sturdevant, R. A. L.; Isenberg, J. I.; Secrist, D.; Ansfield, J. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 72(1):1-5; 1977.

A comparison of an antacid and a placebo in relieving duodenal ulcer pain in patients with duodenal ulcers and epigastric pain is presented. One study on ten hospitalized patients receiving randomized doses of antacid or placebo over 5 days showed no significant difference in the degree of relief of pain, the time required to achieve relief, or the duration of the relief, as evaluated by the patients. A second study on 20 patients receiving a single massive dose of antacid or placebo also failed to reveal any significant difference in effectiveness of the two types of treatment. The authors suggest that factors other than acid neutralization may be important in the relief of acute duodenal ulcer pain, but note also that experiments on a larger patient population may reveal a statistically significant difference in the types of treatment because antacid treatment was arithmetically more effective.

2284 THE EFFECT OF 15 (R) 15 METHYL PROSTAGLANDIN E_2 ON GASTRIC ACID SECRETION IN DUODENAL ULCER PATIENTS. (Eng.) Chen, F. W. K.; Teck, H. S.;

Karim, S. M. N. (Singapore General Hosp., Republic of Singapore). *Prostaglandins* 13(1):115-124; 1977.

The prostaglandin analogue 15-(R)-15-methyl prostaglandin E_2 (15-R-PGE_2) was administered p.o. to 24 duodenal ulcer patients to investigate its effect on basal and pentagastrin-stimulated maximal acid secretion. All patients fasted overnight and were given either a water placebo or 150 μg of the analogue. Basal acid secretion was significantly decreased from 5.9 ± 1.5 mEq/hr to 2.1 ± 0.6 mEq/hr ($p<0.05$) by the prostaglandin analogue. The maximal acid output was also decreased by treatment with the prostaglandin analogue, from 32.1 ± 1.6 mEq/hr to 20.6 ± 1.5 mEq/hr ($p<0.001$). Unlike the basal secretory volume, the maximal secretory volume was significantly reduced after administration of the analogue ($p<0.001$). These results are similar to those observed earlier in healthy subjects, except for the effect upon the maximal secretory volume, and suggest that 15-R-PGE_2 may be useful in duodenal ulcer healing.

2285 THE EFFECT OF ANTRAL DISTENSION ON ACID SECRETION AND PLASMA GASTRIN IN DUODENAL ULCER PATIENTS.

(Eng.) Bergegardh, S.; Nilsson, G.; Olbe, L. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Scand. J. Gastroenterol.* 11(5):475-479; 1976.

The effect of antral balloon distension on gastric acid secretion and on plasma gastrin concentration was studied in 8 duodenal ulcer patients. Antral distention (150 ml) resulted in a significant ($p<0.05$) increase in acid secretion from 5.0 ± 1.2 mEq/45 min during the basal period to 11.1 ± 2.4 mEq/45 min. The latter value is equivalent to about 30% of the peak acid response (13.5 ± 1.4 mEq/15 min) to pentagastrin stimulation (90 μg/hr for 45 min followed by 300 μg/hr for 45 min, i.v.). No significant differences were observed between fasting (51 ± 7 pg/ml) or basal (47 ± 6 pg/ml) plasma gastrin and plasma gastrin values during antral distension (52 ± 6 pg/ml at 150-ml antral distension). Under conditions of intragastric neutralization (Sorensen's phosphate buffer, pH 8.3), antral distension (150 ml) again significantly ($p<0.05$) increased acid secretion from 3.2 ± 0.4 mEq/45 min during the basal period to 11.1 ± 1.9 mEq/45 min. A significant difference ($p<0.01$) also existed between acid output at 150-ml antral distension and the postdistension value (5.3 ± 0.8 mEq/45 min). The mean peak acid output to pentagastrin stimulation was 12.3 ± 1.3 mEq/15 min. Plasma gastrin concentrations measured during antral distension (90 ± 9 pg/ml at 150-ml distension) did not significantly differ from those during the basal period (87 ± 9 pg/ml) or in the fasting state (86 ± 10 pg/ml). Basal acid secretion did not significantly change with the addition of buffer for neutralization (3.2 ± 0.4 mEq/min without and 6.2 ± 1.2 mEq/45 min with buffer). These results suggest that the acid response to antral distension in duodenal ulcer patients is evoked without contribution of the gastrin mechanism and that the acid response is probably mediated via a pyloro-oxyntic reflex.

2286 SELECTIVE LOSS OF PARIETAL CELLS IN THE GASTRIC REMNANT FOLLOWING ANTRAL RESECTION.

(Eng.) Sippónen, P.; Hakkiluoto, A.; Kalima, T. V.; Siurala, M. (Central Lab. Pathology, Univ. Helsinki, Haartmaninkatu, 3, SF-00290 Helsinki 29, Finland). *Scand. J. Gastroenterol.* 11(8):813-816; 1976.

The mucosa of the gastric remnant of 41 patients who had undergone antral resection 17-18 yr previously for peptic ulcer was studied histologically. A normal mucosa was observed in only one patient. Superficial or atrophic gastritis was seen in 27 patients, while the remaining 13 had "selective parietal cell loss." This was characterized by a marked decrease in the number of parietal cells, without any appreciable increase in the number of round cells; the zymogenic chief cells also showed no decrease in number. The foveolar part of the mucosa was hyperplastic, with corkscrew-like structures and hyperplastic mucus-secreting cells. The fasting serum gastrin levels measured in 20 patients were within normal limits. Selective parietal cell loss is thought to reflect a lack of trophic action on parietal cells exerted by gastrointestinal hormones, such as gastrin.

2287 ALTERED PANCREATIC FUNCTION AFTER PROXIMAL GASTRIC VAGOTOMY IN MAN.

(Eng.) Berstad, A.; Roland, M.; Petersen, H.; Liavag, I. (Aker Hosp., Oslo-5, Norway). *Gastroenterology* 71(6):958-960; 1976.

The secretion of bicarbonate into the duodenum in response to stepwise increasing doses of secretin (0.078, 0.23, 0.7, and 2.1 U/kg/hr) was investigated in 11 duodenal ulcer patients before and about 1.5 yr after proximal gastric vagotomy. After the vagotomy, the mean output of bicarbonate in response to the two lowest doses of secretin increased from 2.2 to 3.7 mmol per 30 min in response to 0.078 U/kg/hr and from 6.6 to 9.8 mmol per 30 min in response to 0.23 U/kg/hr. The output of bicarbonate in response to the highest dose of secretin decreased from 20.3 mmol per 30 min before vagotomy to 16.5 mmol per 30 min after the vagotomy. The dose of secretin required for half-maximal stimulation decreased from 0.7 to 0.3 U/kg/hr. The calculated maximal bicarbonate response decreased from 27.8 to 17.7 mmol per 30 min. Thus, the bicarbonate-producing cells have an increased sensitivity to low doses of secretin, and the pancreas has a decreased bicarbonate secretory capacity after proximal gastric vagotomy.

2288 THE FUNCTION OF THE EXOCRINE PANCREAS AFTER EXOGENOUS AND ENDOGENOUS STIMULATION IN BILLROTH II PATIENTS.

(Eng.) Tympner, F.; Rosch, W.; Domschke, W.; Demling, L. (Medizinische Klinik mit Poliklinik der Universitat Erlangen-Nurnberg, Krankenhausstr. 12, 8520 Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(6):444-448; 1976.

To study the possible relation between pancreatic atrophy and post-Billroth II gastrectomy steatorrhea

he function of the exocrine pancreas was studied in
7 patients who had undergone Billroth II gastrec-
omy and in 60 healthy controls. A Lagerlof tube
as placed into the afferent loop endoscopically,
nd pancreatic function was studied after endogenous
timulation (Lundh test meal instillation through
he efferent loop for 60 min) and exogenous stimu-
ation with i.v. secretin (1 CU/kg) plus pancreozymin
l CU/kg). Bicarbonate production and enzyme secre-
ion were similar in the patients and controls dur-
ng endogenous stimulation. During exogenous stimu-
ation, the mean trypsin and chymotrypsin outputs in
he controls were significantly greater than those
n the patients. The results indicate that exocrine
ancreatic function in Billroth II gastrectomy pa-
ients is reduced in comparison with controls follow-
ng maximum stimulation with secretin-pancreozymin;
his is consistent with the previously reported mor-
hological changes in the pancreas of Billroth II
tients.

89 PERSONAL OBSERVATIONS AND EXPERIENCES IN THE DIAGNOSIS AND MANAGEMENT OF ULCER
SEASE AND DISABILITIES THAT FOLLOW PEPTIC ULCER
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90 MEDICAL MANAGEMENT OF BLEEDING DUODENAL ULCERS. (Eng.) Fleshler, B. (Cleveland
inic Foundation, 9500 Euclid Ave., Cleveland,
44106). *Surg. Clin. North Am.* 56(6):1375-
86; 1976.

91 MEDICAL TREATMENT OF GASTRIC AND DUODENAL ULCER. (Eng.) Baron, J. H. (Hammersmith
sp., London W12 OHS, England). *Klin. Wochenschr.*
(19):915-925; 1976.

92 DRUGS FOR PEPTIC ULCER. (Eng.) Clark,
G.; Wyllie, J. H. (Univ. Coll. Hosp. Medical
h., University St., London, WC1E 6JJ, England).
rld J. Surg. 1(1):3-8; 1977.

93 HISTAMINE H_2-RECEPTOR ANTAGONISTS AND GASTRIC ACID SECRETION--A PROGRESS REPORT.
ng.) Black, J. W. (Dept. Pharmacology, Univ. Coll.
ndon, London, England). *Klin. Wochenschr.*
(19):911-914; 1976.

94 DOES CIMETIDINE THERAPY RAISE SERUM GASTRIN IN GASTRIC ULCER PATIENTS
ostract]. (Eng.) Wilcox, L. L.; Englert, E., Jr.;
eston, J. W. (Univ. Utah Coll. Medicine, Salt
ce City, UT). *Clin. Res.* 25(3):320A; 1977.

95 CIMETIDINE CAN CONTROL PEPTIC ULCER DISEASE IN CHILDREN [Abstract]. (Eng.)
lly, J. R.; Hitch, D. C. (Univ. Colorado Sch.
dicine, Denver, CO). *In: the American Pediatric*
iety and Society for Pediatric Research. Combined Program and Abstracts. Held in San Francisco, CA. April 27-29; 1977., p. 445.

2296 COMPARISON OF TRUNCAL VAGOTOMY AND HIGHLY SELECTIVE VAGOTOMY FOR CHRONIC DUODENAL ULCER [Abstract]. (Eng.) Dunn, D. C. (New Addenbrooke's Hosp., 11 Sternes Way, Stapleford, Cambridge, England). *Eur. Surg. Res.* 9(Suppl. 1): 145; 1977.

2297 EPIDEMIOLOGIC PATHOLOGY OF GASTRIC ULCER AND GASTRIC CARCINOMA AMONG JAPANESE IN HAWAII. (Eng.) Stemmermann, G.; Haenszel, W.; Locke, F. (Kuakini Medical Center, 347 N. Kuakini St., Honolulu, HI 96817). *J. Natl. Cancer Inst.* 58(1):13-19; 1977.

2298 THE NATURAL HISTORY OF DUODENAL ULCER DISEASE. (Eng.) Hallenbeck, G. A. (1300 University Ave., Madison, WI 53706) *Surg. Clin. North Am.* 56(6):1235-1248; 1976.

2299 NEWER CONCEPTS IN THE PATHOGENESIS OF PEPTIC ULCER DISEASE. (Eng.) Ippoliti, A.; Walsh, J. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Surg. Clin. North Am.* 56(6):1479-1490; 1976.

2300 IS PEPTIC ULCERATION A HORMONAL DISEASE? (Eng.) Fiddian-Green, R. G. (Univ. Hosp., Ann Arbor, MI 48109). *Lancet* 1(8002):74-76; 1977.

2301 THE GENETICS OF PEPTIC ULCER DISEASE--SEGREGATION OF SERUM GROUP I PEPSINOGEN CONCENTRATIONS IN FAMILIES WITH PEPTIC ULCER DISEASE [Abstract]. (Eng.) Rotter, J. I.; Sones, J. Q.; Richardson, C. T.; Rimoin, D. L.; Samloff, I. M.; McConnell, R. B. (Univ. California at Los Angeles-Harbor General Hosp., Torrance, CA). *Clin. Res.* 25(3):325A; 1977.

2302 OBSTRUCTING DUODENAL ULCER. (Eng.) Hermann, R. E. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Surg. Clin. North Am.* 56(6):1403-1411; 1976.

2303 HLA-B5 ASSOCIATED WITH DUODENAL ULCER [Abstract]. (Eng.) Rotter, J. I.; Rimoin, D. L.; Gursky, J. M.; Terasaki, P.; Sturdevant, R. A. L.; Elashoff, J. (UCLA Sch. Medicine-Harbor General Hosp., Torrance, CA). *Clin. Res.* 25(2):153A; 1977.

2304 EVIDENCE FOR INCREASED ACID EXPOSURE OF THE DUODENUM IN PATIENTS WITH DUODENAL ULCER [Abstract]. (Eng.) Dubois, A.; Smithson, K. W.; Castell, D. O. (Uniformed Services Univ. Health Sciences, Bethesda, MD). *Clin. Res.* 25(1): 17A; 1977.

STOMACH

2305 GASTRIN AND ULCER DISEASE: WHAT IS KNOWN. (Eng.) Ebeid, A. M.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA 02114). *Surg. Clin. North Am.* 56(6):1249-1265; 1976.

2306 DUODENAL GASTRIN CONCENTRATION IN UPPER GASTROINTESTINAL DISORDERS [Abstract]. (Eng.) Hughes, W. (Univ. Texas Medical Branch, Galveston, TX). *Clin. Res.* 25(1):17A; 1977.

2307 ATROPINE EFFECT ON CALCIUM INDUCED ACID SECRETION AND SERUM GASTRIN [Abstract]. (Eng.) Jeffcoat, G. L.; Carter, T.; Turner, M. D. (Univ. Mississippi Medical Center, Jackson, MS). *Clin. Res.* 25(1):50A; 1977.

2308 THE EFFECT OF SMOKING ON SERUM GASTRIN AND SECRETIN [Abstract]. (Eng.) Brady, P. G.; Kolts, B. E. (Dept. Medicine, Univ. Kentucky, Lexington, KY). *Clin. Res.* 25(3):308A; 1977.

2309 GLUCOSE TOLERANCE AND THE SECRETION OF INSULIN AND GLUCAGON IN PATIENTS WITH DUODENAL ULCERATION [Abstract]. (Eng.) Lager, I.; Lundqvist, G.; Dotevall, G. (Sahlgrens Hosp. Univ., Gothenburg, Sweden). *Scand. J. Gastroeterol.* 11(41):18; 1976.

2310 CONTRASTING EFFECT OF PENTAGSTRIN ON GASTRIC EMPTYING IN NORMALS AND PATIENTS WITH GASTRIC ULCER [Abstract]. (Eng.) Gambin, G. T.; Dubois, A.; Castell, D. O. (Uniformed Services Univ. Health Sciences, Bethesda, MD). *Clin. Res.* 25(1):17A; 1977.

See also, 1870, 1877, 1878, 1921, 2108, 2145, 2170, 2171, 2183, 2238, 2240, 2246, 2264, 2265, 2266, 2589, 2591, 2595, 2610, 2614.

SMALL INTESTINE

2311 EFFECTS OF A FAT-REDUCED DIET ON THE FAECAL EXCRETION OF RADIOACTIVITY FOLLOWING ADMINISTRATION OF ^{14}C-CHOLIC ACID AND ON THE DUODENAL CONCENTRATION OF BILE SALTS IN PATIENTS WITH ILEAL DISEASE. (Eng.) Andersson, H. (Sahlgren's Hosp., Goteborg, Sweden). *Nutr. Metab.* 20(4):254-263; 1976.

Patients with ileal disease were subjected to high- versus low-fat diets to determine the effect of reduced fat intake on the fecal excretion of ^{14}C-labeled cholic acid (10 μCi, i.v.) and on the duodenal bile salt concentration. Twelve patients were first observed on a diet with 100 g of fat for 8-16 days, and then on a diet with 40 g of fat for 16-28 days. The abnormally high amounts of fecal radioactivity excreted by all patients on the high-fat diet (58-100%) were significantly lowered after exposure to the low-fat diet (0.2-94%, $p<0.005$). Subnormal duodenal bile salt concentrations were observed in patients with ileal disease on the high-fat diet, but sufficient data were not obtained for the low-fat diet. The bile salt concentrations were also much lower in patients with a functioning gallbladder on the high-fat diet after the evening meal than in the morning. This was not observed with the low-fat diet. The low-fat diet increased the bowel transit time in 7 of 12 patients, and decreased diarrhea in all patients. A reduction in fatty acids in the small intestine probably permits greater absorption of water, electrolytes, and bile salts, as well as a decreased emptying of the gallbladder, thus avoiding the loss of cholic acid and the clinical effect of diarrhea.

2312 INTERRELATIONSHIPS BETWEEN THE GASTROJEJUNAL MICROBIAL FLORA AND THE MORPHOLOGY OF THE JEJUNAL MUCOSA IN ACHLORHYDRIC ENTEROPATHY. (Rum.) Dobre, D.; Hurmuzache, E.; Dobre, V.; Dobrescu, G. (Institutul de medicina si farmacie, Iasi, Romania). *Rev. Med. Chir. Soc. Med. Nat. Iasi* 78(4):809-814; 1974.

The correlation between gastrojejunal bacterial flora and morphological aspect of the jejunal mucosa was studied in 40 patients with diarrheal syndrome and with achlorhydria confirmed by maximally stimulated gastric secretion (histamine test). Bacteria in the gastric juice (10^4-10^6 bacteria/ml, mostly enterobacteria, streptococci, enterococci, and bacteroides) were found in 95% of the patients, compared to sterile gastric juice found in 15 normochlorhydric control subjects. Bacterial presence in the jejunal juice (10^5-10^8/ml, mostly enterobacteria, enterococci, lactobacilli, bacteroides, clostridia, staphilococci, and veillonellae) were found in 93% of the patients, while it was absent in 72% of the controls. Jejunal biopsies revealed jejunitis in 26 patients. Diffuse jejunitis was the most frequent type, but superficial infiltrative and deep interstitial jejunitis were also found. Treatment with tetracycline (1.5 g/day x 8-10, p.o.) in 10/26 patients with confirmed diffuse jejunitis and a bacterial count of 10^6/ml resulted in jejunal sterility in 7 and low bacterial count (10^2-10^3/ml) in 3. Two weeks after the beginning of the treatment, endobiopsies revealed normal jejunal mucosa in six patients, while only superficial jejunitis persisted in four. Lesions of the jejunal mucosa in patients with achlorhydria are directly related to the bacterial flora, whose existence and population density are a function of the disturbances in the gastric pH.

2313 YERSINIA ENTERITIS AND ENTEROCOLITIS: GASTROENTEROLOGICAL ASPECTS. (Eng.)

Vantrappen, G.; Ponette, E.; Geboes, K.; Bertrand, P. (Akademisch Ziekenhuis St. Rafael, B-3000 Leuven, Belgium). *Gastroenterology* 72(2):220-227; 1977.

The clinical, radiological, and endoscopic aspects of *Yersinia enterocolitica* infections in man were studied in 37 adult patients observed over a 4-yr period. The diagnosis was based on isolation of the bacterium in all but one patient. Abdominal pain and diarrhea were the most prominent symptoms, occurring in 80% of the patients. A syndrome simulating appendicitis was observed in 40%. The duration of symptoms before diagnosis varied from 1 or 2 weeks in 32 patients to several months in 5. On radiological examination, the terminal ileum was involved over a distance of 10-20 cm in 21 of 24 patients. A coarse, irregular, or nodular mucosal pattern and pictures suggestive of ulcerations were the most prominent and early radiological signs. Endoscopic observations in 13 patients with marked diarrhea showed signs of colitis in 6 and aphthoid ulcers in 2 patients. On pathological examination, ulcerations and a nonspecific acute inflammatory cell infiltrate were observed. Although treatment with tetracycline or chloramphenicol resulted in the disappearance of most symptoms within 4-6 weeks, pictures of "follicular ileitis" persisted for several months.

2314 RADIOGRAPHIC EVALUATION OF COMPLICATIONS AFTER JEJUNOILEAL BYPASS SURGERY. (Eng.)

Moss, A. A.; Goldberg, H. I.; Koehler, R. E. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Am. J. Roentgenol.* 127(5):737-741; 1976.

A retrospective analysis of 89 patients who underwent jejunoileal bypass surgery for morbid obesity was carried out to determine the number, type, and incidence of complications in which radiographic findings were instrumental in the diagnosis. Thirty-three complications were detected radiographically. These included obstruction (10.1%), cholecystitis and cholelithiasis (5.6%), renal stones (4.5%), peptic ulcers (3.4%), megacolon (6.7%), and jejunal elongation and jejunal and ileal mucosal hypertrophy (6.7%). The most common cause of obstruction was jejunoileal intussusception. Other causes included incarcerated umbilical hernia, volvulus of the jejunum, volvulus and herniation, and misplaced suture. Gallbladder disease occurred only in female patients and was detected 2 weeks to 4 yr after bypass. In the patients with megacolon, the colon was dilated to greater than 7 cm. Ulcerations were not seen, and persistent metabolic or electrolyte abnormalities were not observed. The lack of response to prostaglandin E_1 in the one patient in whom it was administered suggests that some type of autonomic dysfunction is involved in the development of megacolon in these patients.

2315 ABSORPTIVE AND DIGESTIVE FUNCTION OF THE JEJUNUM AFTER JEJUNOILEAL BYPASS FOR TREATMENT OF HUMAN OBESITY. (Eng.)

Fogel, M. R.; Ravitch, M. M.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, PA 15213). *Gastroenterology* 71(5):729-733; 1976.

Leucine, glycylleucine, and glucose absorption rates, and rates of maltose hydrolysis, were determined in the jejunum of seven patients before and 2-20 months after jejunoileal bypass for the treatment of obesity. The leucine absorption rate was significantly reduced after the bypass, but the absorption rates of glycylleucine and glucose, as well as the hydrolysis rate of maltose, were unchanged. Light microscopic investigation of the jejunal mucosa, obtained by a p.o. biopsy technique before and 7 months after the bypass operation, revealed no changes in the histological appearance of this tissue. The plasma aminograms of all patients were compared before and at intervals after the bypass operation; all seven exhibited a constant pattern of change that was characterized by significant decreases in the concentrations of serine and glycine and by significant decreases in the concentrations of valine, isoleucine, leucine, tyrosine, and phenylalanine. This pattern of change, which is characteristic of protein depletion, persisted during the entire period of observation. Two of these seven patients developed laboratory evidence of hepatic dysfunction (transaminase elevations between 90 and 202 IU). It is concluded that protein depletion is common to all patients with jejunoileal bypass, with or without hepatic dysfunction, and that protein depletion results in a sustained reduction in free amino acid absorption in the jejunum.

2316 HEPATIC EFFECTS OF JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.)

Holzbach, R. T. (Cleveland Clinic Foundation, Cleveland, OH 44106). *Am. J. Clin. Nutr.* 30(1):43-52; 1977.

The effects of jejunoileal bypass on the liver are reviewed. The most common hepatic consequence of jejunoileal bypass for morbid obesity is triglyceride accumulation, which usually appears to be maximal during the period of acute weight loss. In some patients, however, because of unknown factors such as the degree of steatosis, its duration, or an as yet undefined unusual patient susceptibility, inflammation and fibrosis occur, culminating in cirrhosis. Certain analogies with alcohol-induced steatosis and its consequences are possible. Given differences between the two states for increased intracellular hepatocyte redox potential and possibly different predominant sources for fatty acid mobilization and production affecting increased intracellular triglyceride synthesis, the remainder of the pathway proposed for the development of cirrhosis from ethanolic liver disease may equally apply to the cirrhosis seen in postbypass patients. This complication, although rare (approximately 3%), has been the subject of recent reports of death or near-death from hepatic failure.

2317 ENDOSCOPIC CANNULATION OF THE PAPILLA OF VATER IN POST-GASTRECTOMY PATIENTS WITH BILLROTH II GASTROJEJUNOSTOMY [Abstract]. (Eng.) Gaisford, W. D. (Latter-Day Saints Hosp., Salt Lake City, UT). *Gastrointest. Endosc.* 21(4):187; 1975.

2318 INTRALUMINAL INCARCERATION OF LONG INTESTINAL TUBES. (Eng.) Spiro, R. K. (1218 Broad St., Bloomfield, NJ 07003). *Am. J. Gastroenterol.* 66(2):160-166; 1976.

2319 STRANGULATED SMALL INTESTINAL OBSTRUCTION FOLLOWING UPPER GASTROINTESTINAL PANENDOSCOPY. (Eng.) Pollard, E. J.; Roberts, R. K.; Nye, J. A. (Royal Brisbane Hosp., Brisbane, Australia). *Gastrointest. Endosc.* 23(3): 166-167; 1977.

2320 DUODENAL MUCOSAL FOLD TEARS PRODUCED BY OBLIQUE VIEWING GASTROSCOPE (GIF-K). (Eng.) Mangla, J. C.; Kalra, T. M. S. (Monroe Community Hosp., 435 East Henrietta Rd., Rochester, NY 14603). *Gastrointest. Endosc.* 23(3):165; 1977.

2321 REOPERATION OF THE SMALL INTESTINE. (Ger.) Brunner, H.; Gronniger, J.; Krieg, H. (Chirurg. Univ.-Klinik, D-6500 Mainz, Langenbeckstr. 1, W. Germany). *Chirurg* 47(1):1-7; 1976.

2322 COMPLICATIONS OF ILEOSTOMY AND COLOSTOMY AND THEIR TREATMENT. (Ger.) Hulten, L.; Keenter, J.; Kock, N. G. (II. Chirurgische Klinik Sahlgren-Krankenhaus, Universitat Goteborg, Goteborg, Sweden). *Chirurg* 47(1):16-21; 1976.

2323 A ROLE FOR BILE ACIDS IN ILEOSTOMY ADAPTATION IN MAN [Abstract]. (Eng.) MacGregor, I. L.; Wiley, Z. D.; Sleisenger, M. H. (Veterans Admin. Hosp., San Francisco, CA). *Clin. Res.* 25(2):152A; 1977.

2324 CAN ASPIRIN DAMAGE THE HUMAN SMALL INTESTINE [Abstract]? (Eng.) Baskin, W. N. Ivey, K. J.; Krause, W.; Terry, B.; MacKercher, P. (Harry S. Truman Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(1):16A; 1977.

2325 STONES, CROHN'S DISEASE, AND MECKEL'S DIVERTICULUM. (Eng.) Harvey, I. C.; White, H. J. O. (St. Mary's Hosp., Newport, Isle of Wight, U.K.) *Br. Med. J.* 2(6044):1107; 1976.

2326 CYST OF THE DUODENUM WITH TERMINATION OF THE BILE AND PANCREATIC DUCTS. (Ger.) Bargon, G. (Department fur Radiologie, Universitat Ulm, Steinhovelstrasse 9, D 7900 Ulm, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(1):41-44; 1976.

2327 ENTEROCOLITIS ASSOCIATED MILK ALLERGY: DEVELOPMENT OF A CONSISTENT CHALLENGE [Abstract]. (Eng.) Powell, G. K. (Univ. Texas Medical Branch, Galveston, TX). *Clin. Res.* 25(1): 70A; 1977.

2328 PRIMARY AORTODUODENAL FISTULA: A RARE CASE OF ACUTE GASTROINTESTINAL HEMORRHAGE. (Eng.) Schapiro, R. L.; Hahn, F. J. Y. (Univ. Iowa Hosps. and Clinics, Iowa City, IA 52242). *JAMA* 236(22):2541-2542; 1976.

2329 ISCHEMIA OF THE SMALL INTESTINE. (Eng.) Marshak, R. H.; Lindner, A. E.; Maklansky, D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Am. J. Gastroenterol.* 66(4 390-400; 1976.

2330 JEJUNOILEAL BYPASS SURGERY FOR OBESITY. (Eng.) Pi-Sunyer, F. X. (St. Luke's Hosp. Center, New York, NY 10025). *Am. J. Clin. Nutr.* 29(4):409-416; 1976.

2331 ILEAL BYPASS FOR OBESITY: POSTOPERATIVE PERSPECTIVE. (Eng.) Faloon, W. W. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY). *Hosp. Pract.* 12(1):73-82; 1977.

2332 INTESTINAL ADAPTATION AFTER JEJUNOILEAL BYPASS IN MAN. (Eng.) Barry, R. E.; Barisch, J.; Bray, G. A.; Sperling, M. A.; Morin, R. J.; Benfield, J. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *Am. J. Clin. Nutr.* 30(1):32-42; 1977.

2333 JEJUNOILEAL BYPASS FOR MORBID OBESITY: EARLY RESULTS AND BODY COMPOSITION CHANGES IN FORTY-FIVE PATIENTS. (Eng.) Goldberger, J. H.; Cha, C. J.; Hazard, W. L.; Randall, H. T.; Clowes, G. H. A., Jr. (Rhode Island Hosp., 593 Eddy St., Providence, RI 02903). *Surgery* 80(4):493-497; 1976.

2334 INTESTINAL CELL DIFFERENTIATION AND PROLIFERATION FOLLOWING SMALL BOWEL BYPASS [Abstract]. (Eng.) Stein, T.; Wise, L. (Long Island Jewish-Hillside Medical Center, New Hyde Par NY). *Clin. Res.* 25(3):319A; 1977.

2335 SEVERE HYPERCHLOREMIC ACIDOSIS COMPLICATI JEJUNOILEAL BYPASS [Abstract]. (Eng.) Fuller, T. J.; Garg, L. C.; O'Leary, J. P.; Cerda, J. J.; Harty, R. F. (Univ. Florida, Gainesville, FL 32510). *Clin. Res.* 25(3):311A; 1977.

36 SYMPTOMATIC MAGNESIUM DEFICIENCY AFTER SMALL-INTESTINAL BYPASS FOR OBESITY. ng.) Lipner, A. (Leicester General Hosp., Lei- ster, England). *Br. Med. J.* 1(6054):148; 1977.

37 PNEUMATOSIS INTESTINALIS AFTER JEJUNOILEAL BYPASS. ETIOLOGICAL MECHANISM IN ONE CASE. ng.) Menguy, R. (Genesee Hosp., 224 Alexander St., chester, NY 14607). *JAMA* 236(15):1721-1723; 1976.

38 PNEUMATOSIS CYSTOIDES INTESTINALIS: A PATHOPHYSIOLOGIC EXPLANATION OF THE ROENT- NOGRAPHIC SIGNS. (Eng.) Olmsted, W. W.; Made- ll, J. E. (Armed Forces Inst. Pathology, Wash- gton, DC 20306). *Gastrointest. Radiol.* 1(2): 7-181; 1976.

39 INFLAMMATORY FIBROID POLYP OF THE ILEUM--A RARE CAUSE OF INTUSSUSCEPTION. (Eng.) Mc- egor, J. C.; Rao, S. S. (Stobhill General Hosp., asgow, Scotland). *Postgrad. Med. J.* 52(604): -91; 1976.

40 GASTROINTESTINAL MYOELECTRIC ACTIVITY IN CHRONIC IDIOPATHIC INTESTINAL PSEUDO- STRUCTION (CIIP) [Abstract]. (Eng.) Sullivan, M. ; Snape, W. J., Jr.; Matarazzo, S. A.; Petrokubi, J.; Jeffries, G. H.; Cohen, S. (Dept. Medicine, Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 25(3):319A; 1977.

2341 INTESTINAL TUBERCULOSIS. (Eng.) Carrera, G. F.; Young, S.; Lewicki, A. M. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *Gastrointest. Radiol.* 1(2):147-155; 1976.

2342 TERMINAL ILEITIS DUE TO Yersinia pseudotuberculosis. (Eng.) Savage, A.; Dunlop, D. (Southmead Hosp., Westbury-on-Trym, Bristol BS10 5NB, England). *Br. Med. J.* 2(6041):916-917; 1976.

See also, 1792, 1827, 1870, 1874, 2070, 2101, 2107,
2137, 2168, 2169, 2170, 2175, 2185, 2187,
2189, 2192, 2193, 2194, 2206, 2227, 2237,
2240, 2248, 2249, 2252, 2253, 2254, 2258,
2350, 2353, 2360, 2362, 2364, 2365, 2388,
2399, 2431, 2447, 2455, 2580, 2589, 2592,
2601, 2604, 2610, 2611, 2614, 2619, 2622.
2623, 2646, 2655, 2659, 2660, 2665.

SMALL INTESTINE

Malabsorption

43 IMMUNOFLUORESCENT ANTIBODIES AGAINST GLIADIN: A SCREENING TEST FOR COELIAC SEASE. (Eng.) Burgin-Wolff, A.; Hernandez, R.; st, M.; Signer, E. (Universitats-Kinderklinik, mergasse 8, CH-4058 Basel, Switzerland). *Helv. ediatr. Acta* 31(4/5):375-380; 1976.

immunofluorescence test for gliadin antibodies s evaluated for its usefulness as a screen for liac disease. The presence of specific antibodies either gliadin or cow milk protein in human sera s detected by indirect fluorescence-labeling of arose beads coupled to these antigens. Rabbit ti-human IgM, IgA, IgG, and fluorescein-marked at anti-rabbit Ig antisera were used to selective- label the beads. Twenty-three children with oven celiac disease, 71 children with other malab- rptive disorders, and 20 healthy adults were sted for gliadin and cow milk antibodies by the munofluorescence test, the Ouchterlony test, and mplement fixation. The immunofluorescence test s positive for 19 (83%) patients with celiac sease, 3 (4%) patients with other malabsorptive sorders, and none of the healthy adults. In con- ast, the Ouchterlony test and complement fixation tected gliadin antibodies in only 8 (35%) and 12 (52%) of the patients with celiac disease, resp. Gliadin antibodies were also differentiated by immunoglobulin class in the immunofluorescence test. The rate of disappearance of gliadin antibodies in the blood upon prolonged treatment with a gluten-free diet was irregular, and the absence of gliadin antibodies in 4 of the 23 patients with celiac disease was attributed to insufficient gluten in their diet prior to blood sampling. The test for antibodies to cow milk proteins was positive in 91% of the celiac patients, but could not be used in diagnosis of celiac disease since antibodies were also detected in 49% of the patients with other malabsorption disorders. However, the gliadin antibody test proved to be a very sensitive screening method for celiac disease.

2344 THE ENDOSCOPIC DEMONSTRATION OF COELIAC DISEASE. (Eng.) Stevens, F. M.; McCarthy, C. F. (Regional Hosp., Galway, Ireland). *Endoscopy* 8(4):177-180; 1976.

Endoscopic examination and mucosal biopsy of the duodenal cap were carried out in 11 untreated adult celiac disease patients, in 4 treated adult celiac patients, and in 25 patients without this disease to determine whether the procedure is an acceptable alternative to suction biopsy from the region of the ligament of Treitz for the diagnosis of celiac disease. In the untreated celiac patients, the mucosa had pale or erythematous patches. Blood vessels were obvious in some areas. No petechiae were noted, and the mucosa did not traumatize easily. In these patients and in two treated patients who either did not adhere to the gluten-free diet or had only been on the diet for 4 weeks, villous atrophy similar to that found in the distal duodenum and jejunum was seen in the duodenal cap. Villi were seen in the duodenal caps of all controls and in two treated celiac patients who had adhered to a gluten-free diet for at least 6 weeks. The application of indigo carmine to the mucosal surface made the mucosal contours more obvious. Finger and leaf villi were seen endoscopically in nonceliac patients, which contrasted with the flat mosaic appearance in the untreated celiac patients. In the duodenal cap biopsy specimens of the untreated patients, characteristic changes found in the jejunum in celiac disease were seen (i.e., flattening of columnar epithelium with loss of basal orientation of their nuclei, increased numbers of intraepithelial lymphocytes, a preponderance of plasma cells and lymphocytes in the lamina propria, and severe villous atrophy). The results indicate that the endoscopic appearance of the duodenal cap in celiac disease is similar to that of the more distal areas of the small intestine.

2345 ULTRASTRUCTURAL LOCALIZATION OF IgA GLOBULINS IN NORMAL AND COELIAC INTESTINAL MUCOSA USING IMMUNOENZYMATIC METHODS. (Eng.) Jos, J.; Labbe, F. (INSERM, Hopital des Enfants-Malades, 149 rue de Sevres, 75730 Paris Cedex 15, France). *Biomedicine* 24(6):425-433; 1976.

Peroxidase-labeled antibodies were employed in the electron microscopic localization of IgA in duodenojejunal biopsies from three children with active celiac disease and from four controls. Monospecific antibodies were bound to horseradish peroxidase, and intestinal biopsies were successfully penetrated after being fixed in 4% formaldehyde for 20 hr. The present ultrastructural observations confirmed earlier immunofluorescent findings that the healthy duodenojejunal mucosa contains a large number of IgA plasma cells, particularly in the lamina propria. Previous ultrastructural localization of the immunoglobulins in the perinuclear space and rough endoplasmic reticulum of immunocytes was confirmed; the pattern is similar to that observed in IgG plasma cells. The theory that the immunoglobulins pass through the basement membrane of the epithelium, combine with the secretory component, and enter the epithelial cells before passing through to the lumen was confirmed. However, unlike a previously reported study, IgA was mostly observed on the lower, rather than the upper, part of the lateral cell membranes. Abnormally high densities of IgA plasma cells were observed in the mucosae of children with active celiac disease. Particularly heavy deposits were seen on the basement membrane of epithelial cells and the wall of blood vessels. It is concluded that immunoenzymatic methods are useful
in studying the ultrastructural localization of immu
globulins.

2346 MEGACOLON ASSOCIATED WITH CELIAC SPRUE:
PORT OF FOUR CASES AND REVIEW OF THE LITER
TURE. (Eng.) Kappelman, N. B.; Burrell, M.; Troffler, R. (Johns Hopkins Hosp., Baltimore, MD 21205). *Am. J. Roentgenol.* 128(1):65-68; 1977.

The cases of four patients with megacolon in associa
tion with celiac sprue are reported. The patients
cluded a 55-yr-old man with a 15-yr history of diar-
rhea, a 13-month-old girl, a 21-month-old girl, and
a 6-yr-old girl. The two youngest patients had moto
growth retardation and other symptoms of malabsorp-
tion, and the 6-yr-old girl had a 3- to 4-month his-
tory of progressive vomiting, diarrhea, weight loss,
and abdominal distention. None of the patients had
constipation. Barium enema examination revealed a
dilated redundant colon with normal evacuation in
all patients. Upper gastrointestinal series demon-
strated thickened mucosal folds and only minimal
small bowel dilatation. Small bowel biopsies were
consistent with celiac disease in the three patient
in whom they were performed. All patients responde
to a gluten-free diet. Megacolon in these patients
may be related to increased total bulk delivered to
the colon and/or to an intrinsic colonic abnormalit
of celiac sprue.

2347 TRANSIENT PARAPROTEINAEMIA IN A PATIENT
WITH COELIAC DISEASE. (Eng.) Pena, A. S
Nieuwkoop, J.; Schuit, H. R. E.; Hekkens, W. T. J.
Haex, A. J. C. (State Univ. Hosp., Leyden, Netherlands). *Gut* 17(9):735-739; 1976.

A case is reported of a 43-yr-old man with a grass
pollen allergy and a malabsorption syndrome in whom
a paraproteinemia was found. The grass pollen hype
sensitivity was abolished by desensitization. The
malabsorption syndrome was caused by celiac disease
the jejunal mucosa appeared flat, while the ileal
mucosa was almost normal. Clinical recovery and mo
phological improvement resulted when the patient wa
placed on a gluten-free diet. A short period of gl
ten reintroduction caused deterioration of the jeju
nal histology. The monoclonal IgG-λ dminished and
disappeared in the course of 3 yr. Although it was
not possible to demonstrate that this paraprotein h
antigliadin activity, it is suggested that the
constant stimulation of the gut reticuloendothelial
system by gluten might have been related to the
appearance of the paraproteinemia.

2348 LACTASE DEFICIENCY: A COMMON GENETIC TRA
OF THE AMERICAN INDIAN. (Eng.) Newcomer
A. D.; Thomas, P. J.; McGill, D. B.; Hofmann, A. F.
(Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 72(2):234-237; 1977.

To determine the prevalence and age of onset of lac
tase deficiency in American Indians, intestinal lac
tase activity was assessed indirectly in 156 India

by measuring breath hydrogen after a p.o. lactose load. Lactase deficiency was present in 66% of the subjects and correlated highly with the percentage of Indian blood. Lactase deficiency was present by the age of 5 yr and was unrelated to sex. Most lactase-deficient subjects (81%), but only a minority (23%) of lactase-sufficient subjects, developed symptoms after the p.o. lactose load, and among lactase-deficient subjects, symptoms occurred more frequently in adults than in children (p=0.05). By history, 53% of lactase-deficient adults, but only 10% of lactase-deficient children under 18 yr of age, were aware of milk intolerance. Despite these differences, milk consumption was only slightly less (19 g) in the lactase-deficient subjects than in those with normal lactase activity (25 g, p<0.05). The results indicate that lactase deficiency is a common autosomal genetic trait in the American Indian that becomes manifest in early childhood. Tolerance to dietary lactose appears to decline in the American Indian as he reaches adulthood, but in this population, the decline in tolerance had only minor influence on lactose intake.

2349 DIAGNOSIS OF DISEASES PRODUCING MALABSORPTION. (Eng.) Floch, M. H. (Norwalk Hosp., Norwalk, CT 06856) *Primary Care* 2(3):411-430; 1975.

2350 IMMUNOGLOBULINS AND MALABSORPTION. (Eng.) Jones, E. A. (Dept. Medicine, Univ. Liverpool, Liverpool, England). *Acta Clin. Belg.* 30(6):466-473; 1975.

2351 ZINC THERAPY IN ACRODERMATITIS ENTEROPATHICA. (Eng.) Leupold, D.; Poley, J.R.; Meigel, W. N. (Universitats-Kinderklinik, Prittwitzstrasse 43, D-79 Ulm, [Donau], W. Germany). *Helv. Paediatr. Acta* 31(2):109-115; 1976.

2352 TREATMENT OF ACRODERMATITIS ENTEROPATHICA WITH ZINC SULPHATE: REPORT OF 3 CASES. (Eng.) Lungarotti, M. S.; Rufini, S.; Calabro, A.; Mariotti, G.; Ghebregzabher, M.; Monaldi, B. (Policlinico Monteluce, I-06100 Perugia, Italy). *Helv. Paediatr. Acta* 31(2):117-120; 1976.

2353 GASTRIN (IRG) AND GASTRIC INHIBITORY POLYPEPTIDE (GIP) AFTER PARTIAL DUODENO-PANCREATECTOMY AND IN COELIAC DISEASE [Abstract]. (Eng.) Arnold, R.; Ebert, R.; Brown, J. C.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Eur. J. Clin. Invest.* 6(4):327; 1976.

2354 ON THE ROLE OF CARBOHYDRATE IN GLIADIN TOXICITY IN COELIAC DISEASE [Abstract]. (Eng.) Stevens, F. M.; Phelan, J. J.; McNicholl, B.; Cottrell, P. F.; McCarthy, C. F. (Regional Hosp., Galway, Ireland). *Gut* 17(5):398; 1976.

2355 GLUTEN ANTIBODIES (GA) IN COELIAC DISEASE (CD) AND DERMATITIS HERPETIFORMIS (DH) [ABstract]. (Eng.) Scott, B. B.; Losowsky, M. S. (St. James' Hosp., Leeds LS9 7TF, England). *Gut Gut* 17(5):398; 1976.

2356 GLUTEN-INDUCED ENTEROPATHY IN BOTH MEMBERS OF A MONOZYGOTIC TWIN PAIR [Abstract]. (Eng.) Chaun, H.; Lowry, R. B.; Bogoch, A. (Dept. Medicine, Univ. British Columbia, Vancouver, Canada). *Clin. Res.* 24(5):664A; 1976.

2357 PANCREATIC EXOCRINE SECRETION IN PATIENTS WITH COELIAC DISEASE [Abstract]. (Eng.) Rolhy, P.; Gillberg, R. (Sahlgren's Hosp., Gothenburg, Sweden). *Scand. J. Gastroenterol.* 11(41): 31; 1976.

2358 POSTVAGOTOMY UNMASKING OF NONTROPICAL SPRUE. (Eng.) Moss, A. A. (Univ. California Sch. Medicine, San Francisco, CA 94112). *Gastrointest. Radiol.* 1(2):173-175; 1976.

2359 FARMER'S LUNG AND COELIAC DISEASE [Abstract]. (Eng.) Robinson, T. J. (Craigavon Area Hosp., N. Ireland). *Gut* 17(5):398; 1976.

2360 CHEMICAL COMPOSITION OF THE BRUSH BORDER MEMBRANE IN CONGENITAL INTESTINAL ENZYME DEFICIENCIES [Abstract]. (Eng.) Freiburghaus, A.; Schmitz, J.; Hadorn, B. (Dept. Pediatrics, Univ. Berne, Berne, Switzerland). *Eur. J. Clin. Invest.* 6(4):326; 1976.

2361 REVERSIBLE MALABSORPTION OF FOLIC ACID IN THE ELDERLY WITH NUTRITIONAL FOLATE DEFICIENCY. (Eng.) Elsborg, L. (Medical Dept. II, Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Acta Haematol. (Basel)* 55(3):140-147; 1976.

2362 CHRONIC DIARRHOEA AND GLUTEN SENSITIVITY [Abstract]. (Eng.) Cooper, B. T.; Holmes, G. K. T.; Ferguson, R.; Thompson, R.; Cooke, W. T. (General Hosp. Birmingham B4 6NH, England). *Gut* 17(5):398; 1976.

2363 PERSPECTIVE ON MILK-DRINKING AND MALABSORPTION OF LACTOSE. (Eng.) Simoons, F. J.; Johnson, J. D.; Kretchmer, N. (Natl. Inst. Child Health and Human Development, Bethesda, MD 20014). *Pediatrics* 59(1):98-109; 1977.

2364 ENTEROCYTE TURNOVER AND ACQUIRED LACTASE DEFICIENCY IN INFANTS [Abstract]. (Eng.) Torres-Pinedo, R. (Univ. Oklahoma Health Sciences Center, Oklahoma City, OK). *Clin. Res.* 25(1):70A; 1977.

SMALL INTESTINE

2365 DEVELOPMENT OF CONTROLLED MALABSORPTION SYNDROME IN UTMOST REGULATORY OBESITY TREATMENT [Abstract]. (Eng.) Goral, R.; Tuszewski, M. (Gastroenterology Clinic, Inst. Surgery, 49, Przybyszewski Str., 60-355 Poznan, Poland). *Eur. Surg. Res.* 9(Suppl. 1):160; 1977.

2366 D-XYLOSE ABSORPTION AND JEJUNAL MORPHOLOGY IN AFRICAN PATIENTS WITH PELLAGRA (NIACIN TRYPTOPHAN DEFICIENCY). (Eng.) Cook, G. C. (Hosp. for Tropical Diseases, London, NW1 OPE, England). *Trans. R. Soc. Trop. Med. Hyg.* 70(4): 349-351; 1976.

2367 THE ROLE OF ANAEROBIC BACTERIA IN THE B_{12} MALABSORPTION OF THE STASIS SYNDROME [Abstract]. (Eng.). Welkos, S.; Toskes, P.; Baer, H. (Veterans Admin. Hosp., Gainesville, FL). *Clin. Res.* 25(3):320A; 1977.

2368 WHIPPLE DISEASE. AN IMMUNOLOGIC AND ELECTRON MICROSCOPY STUDY. (Fre.) Barbier, P.; Balasse-Ketelbant, P.; Kennes, B.; Menu, R.; Platteborse, R.; Parmentier, R. (Hopital Universitaire Saint-Pierre, 46, rue de l'Ermitage, 1050 Bruxelles, Belgium). *Arch. Fr. Mal. App. Dig.* 64(8):659-666; 1975.

See also, 2166, 2188, 2191, 2197, 2245, 2311, 2315, 2336, 2419, 2606, 2608, 2659, 2660, 2665.

LARGE INTESTINE

2369 INCIDENCE OF DIARRHEA AND COLITIS ASSOCIATED WITH CLINDAMYCIN THERAPY. (Eng.) Neu, H. C.; Prince, A.; Neu, C. O.; Garvey, G. J. (Columbia Univ. Coll. Physicians and Surgeons, 630 West 168th St., New York, NY 10032). *J. Infect. Dis.* 135(Suppl.):S120-S125; 1977.

Side-effects associated with the oral and parenteral use of the antimicrobial agent, clindamycin, were investigated in a retrospective and prospective study of 200 patients who received the drug for a 15-month period. The age of the patients ranged from 3 to 95 months. Gastrointestinal symptoms were observed in 43 (21.5%) of the patients, while 27 (13.5%) had diarrhea, and 5 (2.5%) developed proven colitis. The mean ages of patients with and without gastrointestinal symptoms were 49.6 and 48.7 yr, resp. The mean age for patients with diarrhea was 61 yr. Diarrhea was observed in 33% of the patients older than 71 yr, and in only 11% of the patients 30 yr old or younger, indicating a much larger incidence of this particular side-effect with increasing age. A higher incidence of gastrointestinal symptoms and diarrhea occurred when clindamycin was administered parenterally rather than orally. Females had a higher incidence of gastrointestinal symptoms and diarrhea than did males. Use of clindamycin in the presence of another antibiotic did not significantly increase the incidence of gastrointestinal symptoms and diarrhea. The frequency of clindamycin-associated diarrhea, according to the condition being treated, was: 20% for ear, nose, and throat infections; 15% for gastrointestinal disease; 14% for respiratory infection; and 11% for gynecologic disease. There was no diarrhea with orthopedic and cutaneous infections. Finally, most gastrointestinal effects were eventually alleviated by discontinuing clindamycin treatment. It was concluded that the incidence of side-effects associated with clindamycin is not as great as previously reported. The drug can b used with caution as a treatment for anaerobic infe tions in adults and children.

2370 ANGIODYSPLASIA OF THE COLON: DIAGNOSIS AN TREATMENT. (Eng.) Wolff, W. I.; Grossman M. B.; Shinya, H. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Gastroenterology* 72(2):329-333; 1977.

The cases of three patients who had long-standing gastrointestinal bleeding secondary to intestinal vascular malformations are reported. The patients were elderly men (67-75 yr). The malformations wer all submucosal, and were not detected on barium ene examination. The first patient had a 1-yr history of recurrent rectal bleeding; at the time of the initial hemorrhage, an emergency hemigastrectomy had been performed. Colonoscopy revealed a lesion approximately 3 cm distal to the ileocecal valve, and a right hemicolectomy was performed. The histologic examination suggested hereditary hemorrhagi telangiectasia. The second patient had a 3-month history of intermittent blood in the stools. Colon scopy was performed to the cecum, where multiple areas of telangiectasia were seen. There was no active bleeding at that time. Angiography did not demonstrate this lesion or the presence of other vascular malformations. Right hemicolectomy was carried out, and the histopathological diagnosis was angiodysplasia of the bowel. The third patient had recurrent undiagnosed rectal bleeding (fresh or dark blood) for 6 yr. Physical examination reveale a telangiectatic lesion on the inner side of the lower lip. Angiography of the entire intestine via the celiac axis and inferior mesenteric arteries disclosed a possible arteriovenous malformation in

ne cecum, which was confirmed by colonoscopy. There
as evidence of slow, active bleeding. A right
emicolectomy was performed; in all patients, this
rocedure resulted in the resolution of symptoms.
ndoscopy is a simple method of detecting intestinal
ascular malformations.

371 VASCULAR DYSPLASIA OF THE CECUM AS A REPEATED SOURCE OF HEMORRHAGE: ROLE OF
OLONOSCOPY IN DIAGNOSIS. (Eng.) Thanik, K. D.;
hey, W. Y.; Abbott, J. (Genessee Hosp., 224 Alex-
nder St., Rochester, NY 14607). *Gastrointest.*
ndosc. 23(3):167-169; 1977.

he case of a 56-yr-old man in whom vascular dys-
lasia of the cecum was the source of recurrent
astrointestinal bleeding is presented. The patient
ad a 4-yr history of painless bloody diarrhea and
eakness. During this period, he underwent barium
xaminations, laparotomy, transverse colostomy, and
ngiographic studies, none of which revealed the site
f bleeding. Three colonoscopic examinations through
ne colostomy, one of which was carried out during
nonbleeding period, were unremarkable. A fourth
olonoscopic examination, performed during a bleeding
eriod, revealed a small erosion in the cecum. The
atient is asymptomatic 22 months after an ileo-
scending colectomy was performed. Histologically,
ne lesion appeared as a localized collection of
nin-walled, dilated, venous channels, which were
ined with endothelium and were confined to the mu-
osa and submucosa. The judicious use of fiberoptic
olonoscopy is helpful in determining a source of
emorrhage in the large intestine.

372 BENIGN ULCERATION OF THE CECUM. (Eng.)
Brodey, P. A.; Hill, R. P.; Baron, S. (Mt.
ion Hosp. and Medical Center, P.O. Box 7921, San
rancisco, CA 94120). *Radiology* 122(2):323-327;
977.

hree cases of benign ulceration of the cecum are
resented. Two patients, a 50-yr-old man and a 30-
r-old woman, both heroin users, presented with ab-
ominal pain; emesis and diarrhea were present in
ne first patient, but no hemorrhage was present.
ne third patient, a 44-yr-old man, presented with
elena. In the first two patients, barium enema
xamination revealed a markedly abnormal cecum,
ondistensible in one case and at least partially
istensible in the other. The distorted appearance
as caused by inflammatory reaction, making an
ntrinsic abnormality more likely than secondary
nvolvement due to an extrinsic process. Both
atients were treated surgically. In the third
atient, a selective superior mesenteric artery
njection demonstrated an extravasation of contrast
edium in the region of the cecum. The bleeding
as controlled with vasopressin, although the cecum
nd terminal ileum were resected 7 days later. The
erminal ileum in all patients was normal. Acute
lceration of the cecum should be included in the
adiological differential diagnosis of an abnormal
ecum either shown on barium enema examination or
hen bleeding is demonstrated angiographically in the
ecal region.

2373 ANGIODYSPLASIA OF THE CECUM: COLONOSCOPIC DIAGNOSIS. (Eng.) Skibba. R. M.; Hartong, W. A.; Manta, F. A.; Hinthorn, D. R.; Rhodes, J. B. (Wichita Clinic, 3244 East Douglas St., Wichita, KS 67208). *Gastrointest. Endosc.* 22(3):177-179; 1976.

2374 ACQUIRED ATRESIA OF THE COLON. (Eng.) Guttman, F. M. (No affiliation given). *J. Pediatr. Surg.* 11(6):1025-1028; 1976.

2375 INFECTIONS BY ANAEROBIC BACTERIA OF THE BOWEL. (Eng.) Goodman, J. S. (Mercy Hosp., Baltimore, MD). *Adv. Intern. Med.* 21:129-147; 1976.

2376 NATURAL FIBER AND BOWEL DYSFUNCTION. (Eng.) Connell, A. M. (Univ. Cincinnati, Coll. Medicine, Cincinnati, OH 45267). *Am. J. Clin. Nutr.* 29(12):1427-1431; 1976.

2377 LOW-FIBER INTAKE AS AN ETIOLOGIC FACTOR IN CANCER OF THE COLON. (Eng.) Modan, B.; Barell, V.; Lubin, F.; Modan, M.; Greenberg, R. A.; Graham, S. (Chaim Sheba Medical Center, Tel Hashomer, Israel). *J. Natl. Cancer Inst.* 55(1):15-18; 1975.

2378 AN ANALYSIS OF BOWEL HABIT AND ITS SIGNIFICANCE IN THE DIAGNOSIS OF CARCINOMA OF THE COLON. (Eng.) Jones, I. S. C. (Dept. Obstetrics, Gynecology, Univ. Qheensland, Australia). *Am. J. Proctol.* 27(3):45-50, 52, 54, 56; 1976.

2379 EFFECT OF QUALITY AND QUANTITY OF DIETARY FAT AND DIMETHYLHYDRAZINE IN COLON CARCINOGENESIS IN RATS. (Eng.) Reddy, B. S.; Narisawa, T.; Vukusich, D.; Weisburger, J. H.; Wynder, E. L. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Proc. Soc. Exp. Biol. Med.* 151(2):237-239; 1976.

2380 PRIMARY ADENOCARCINOMA OF THE APPENDIX. A CLINICO-PATHOLOGICAL STUDY OF 11 CASES. (Eng.) Quizilbash, A. H. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario, Canada L8V IC3). *Arch. Pathol.* 99(10):556-562; 1975.

2381 MULTIFOCAL COLONIC CARCINOMA AND CROHN'S DISEASE. (Eng.) Keighley, M. R. B.; Thompson, H.; Alexander-Williams, J. (Queen Elizabeth Hosp., Edgbaston, Birmingham, England). *Surgery* 78(4):534-537; 1975.

2382 PROGNOSIS OF COLO-RECTAL CARCINOMA IN SUDAN. (Eng.) Elmasri, S. H.; Boulos, P. B. (Middlesex Hosp., London, WIN 8AA, England). *Trop. Geogr. Med.* 28(3):187-190; 1976.

2383 AGE-RELATED FREQUENCY OF COLON CARCINOMA: IMPLICATIONS FOR COLON CANCER SCREENING [Abstract]. (Eng.) Landres, R. T.; Strum, W. B. (Scripps Clinic, La Jolla, CA). *Clin. Res.* 25(2):110A; 1977.

2384 DEVIATION OF THE RECTOSIGMOID COLON STIMULATING A PRESACRAL TUMOR: REPORT OF A CASE. (Eng.) Lawson, T. L.; Bowers, J. B.; Citrin, C. M. (George Washington Univ. Medical Center, 901 23rd St., N.W., Washington, DC 20037). *Dis. Colon. Rectum* 19(4):360-362; 1976.

2385 PHARMACOLOGY OF HUMAN ISOLATED COLONIC CIRCULAR AND LONGITUDINAL SMOOTH MUSCLE FROM CANCER AND NON-CANCER PATIENTS. (Eng.) Hughes, J. P.; Kadowitz, P. J.; Hyman, A. L.; Ray, J. E.; Joiner, P. D. (Tulane Univ. Sch. Medicine, 1430 Tulane Ave., New Orleans, LA 70112). *Dis. Colon Rectum* 19(2):120-125; 1976.

2386 ACUTE SOLITARY DIVERTICULITIS OF THE ASCENDING COLON. (Eng.) Welling, R. E. (7770 Cooper Rd., Cincinnati, OH 45242). *Ohio State Med. J.* 72(6):366-367; 1976.

2387 THE PROGNOSIS OF IDIOPATHIC PROCTITIS AND DISTAL COLITIS [Abstract]. (Eng.) Powell-Tuck, J.; Ritchie, J. K.; Lennard-Jones, J. E. (St. Mark's Hosp., London, England). *Gut* 17(5): 392; 1976.

2388 YERSINIA ENTERITIS AND ENTEROCOLITIS [Abstract]. (Eng.) Vantrappen, G.; Ponette, E.; Geboes, K.; Bertrand, P. (Univ. Hosp. St. Rafael, Leuven, Belgium). *Gut* 17(5):392; 1976.

2389 PSEUDOMEMBRANOUS ENTEROCOLITIS. (Eng.) Nolan, D. J.; Goodman, M. J.; Skinner, J. M. (Radcliffe Infirmary, Oxford, OX2 6HE, England). *Proc. R. Soc. Med.* 69(8):621-622; 1976.

2390 PSEUDOMEMBRANOUS COLITIS ASSOCIATED WITH ANTIBIOTICS. (Eng.) Medline, A.; Shin, D. H.; Medline, N. M. (Toronto Western Hosp., Toronto, Ontario, Canada). *Hum. Pathol.* 7(6):693-703; 1976.

2391 CRYOSURGERY FOR HEMORRHOIDS. (Eng.) Goligher, J. C. (Leeds General Infirmary, Leeds 1, England). *Dis. Colon Rectum* 19(3):213-218; 1976.

2392 LEUKOPLAKIA OF THE ANAL CANAL. (Eng.) Bender, M. D.; Lechago, J. (931 W. San Bruno Ave., San Bruno, CA 94066). *Am. J. Dig. Dis.* 21(10):867-872; 1976.

2393 MOBILE CECAL SNYDROME IN THE ADULT. (Eng.) Printen, K. J. (Univ. Hosp., Iowa City, IA 52242). *Am. Surg.* 42(3):204-205; 1976

2394 DISTAL NEONATAL INTESTINAL OBSTRUCTION: THE CHOICE OF CONTRAST MATERIAL. (Eng.) Poole, C. A.; Rowe, M. I. (Univ. Miami Sch. Medicine P.O. Box 520875, Biscayne Annex, Miami, FL 33152). *J. Pediatr. Surg.* 11(6):1011-1022; 1976.

2395 HEPATODIAPHRAGMATIC INTERPOSITION OF THE INTESTINE (CHILAIDITI'S SYNDROME). (Eng.) Vessal, K.; Borhanmanesh, F. (Dept. Radiology, Pahlavi Univ., Shiraz, Iran). *Clin. Radiol.* 27(1):113-116; 1976.

2396 PERFORATION OF THE NORMAL COLON DURING BARIUM CONTRAST EXAMINATION. (Eng.) Kahn, S. P.; Lindenauer, S. M.; Wojtalik, R. S. (2215 Fuller Rd., Ann Arbor, MI 48105). *Am. Surg.* 42(10):789-792; 1976.

2397 VOLVULUS OF THE TRANSVERSE COLON, A LONG-TERM COMPLICATION OF HEMICOLECTOMY: REPORT OF A CASE. (Eng.) Smith, M. F.; Dalling, R. (Dumfries and Galloway Royal Infirmary, Dumfries, Scotland). *Dis. Colon Rectum* 19(8):684-685; 1976..

2398 TRANSVERSE COLON VOLVULUS: CASE REPORTS AND REVIEW. (Eng.) Newton, N. A.; Reines, H. D. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *Am. J. Roentgenol.* 128(1): 69-72; 1977.

2399 GASTROINTESTINAL ENDOSCOPIC POLYPECTOMY. (Eng.). Barrett, P. J.; Nagy, G. S. (Royal North Shore Hosp., 14 Marshall Ave., St. Leonards, N.S.W. 2065, Australia). *Med. J. Aust.* 63(1/2):5-7; 1976.

2400 COLORECTAL POLYPS AND CARCINOMA IN SOUTHERN IRAN. (Eng.) Haghighi, P.; Nasr, K.; Mohallatee, E. A.; Ghassemi, H.; Sadri, S Nabizadeh, I.; Sheikholeslami, M. H.; *et al.* (Pahlavi Univ. Sch. Medicine, Shiraz, Iran). *Cance* 39(1):264-278; 1977.

2401 FAMILIAL POLYPOSIS. (Eng.) DeCosse, J. Adams, M. B.; Condon, R. E. (8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Cancer* 39(1): 267-273; 1977.

2402 BILHARZIASIS AND PROLAPSE OF THE RECTUM. (Eng.) Abul-Khair, M. H. (Dept. General Surgery, Cairo Univ., Cairo, Egypt). *Br. J. Surg.* 63(11):891-892; 1976.

03 THE EFFECT OF PSYLLIUM HYDROCOLLOID ON BILE ACID DECONJUGATION [Abstract].
ng.) Trippi, J. A.; Hall, R. C.; Klauda, H. C.
pstate Medical Center, Syracuse, NY). *Clin. Res.*
(1):19A; 1977.

04 MORBIDITY OF COLOSTOMY CLOSURE. (Eng.) Yajko, R. D.; Norton, L. W.; Bloemendal, L.;
seman, B. (1905 Blake St., Glenwood Springs, CO
601). *Am. J. Surg.* 132(3):304-306; 1976.

2405 THE ANTIDIARRHEAL SPECIFICITY OF LOPERAMIDE HCl [Abstract]. (Eng.) Niemegeers, C. J. E.; McGuire, J. L. (Janssen Pharmaceutica, Beerse, Belgium). *Fed. Proc.* 36(3):1019; 1977.

See also, 1789, 2063, 2072, 2168, 2181, 2192, 2195, 2196, 2200, 2227, 2237, 2243, 2260, 2313, 2318, 2322, 2327, 2338, 2340, 2341, 2362, 2409, 2413, 2481, 2592, 2593, 2601, 2611, 2616, 2627, 2636, 2646, 2669.

LARGE INTESTINE

Ulcerative Colitis

06 VIRAL DNA IN INFLAMMATORY BOWEL DISEASE: CMV-BEARING CELLS AS A TARGET FOR IMMUNE-
EDIATED ENTEROCYTOLYSIS. (Eng.) Roche, J. K.;
uang, E. S. (Duke Univ. Medical Center, Durham,
: 27710). *Gastroenterology* 72(2):228-233; 1977.

nsitive biochemical techniques were used in an
tempt to detect mature cytomegalovirus (CMV) in
seased tissue of patients with inflammatory bowel
sease. Membrane complementary RNA-DNA hybrid-
ation showed that CMV DNA was not detectable
three cases of Crohn's disease, nor was it pre-
nt in three of four cases of ulcerative colitis
amined. Five tissue specimens taken 5 cm from
colonic tumor were also negative. An *in situ*
bridization study of diseased tissue, including
ecimens from six patients with inflammatory bowel
sease and those patients already mentioned, showed
few grains distributed over cells superficial to
e muscularis mucosa; this was not regarded as signi-
icantly different from that in controls. The asso-
iation of CMV with Crohn's disease (0 positives in
patients by either test) is not supported by
is study; the association with ulcerative colitis
positive in 9 patients by either test) requires
rther study before a definitive conclusion can be
de.

07 THE GLYCOCALYX OF THE EPITHELIAL CELLS OF THE COLON, OBSERVED IN NORMAL AND ULCEROUS
LITIC CONDITIONS. (Eng.) Ceralli, F.; Familiari,
; Marinozzi, G.; Muccioli-Casadei, D. (Istituto di
atomia Umana Normale dell'Universita, Viale Regina
ena 289, Rome, Italy). *Experientia* 32(12):1542-
44; 1976.

The polysaccharide coat in the epithelium of normal colon and in that affected by ulcerative colitis was studied ultrastructurally. The surface of normal epithelial cells was covered by a glycoprotein that apparently cemented the adjacent cells. This coat was thinner in ulcerative colitis, and fibrillar bridges of polysaccharide-like material were stretched from one membrane to another. In normal cells, the glycocalyx appeared as a continuous coat on the surfaces of the microvilli, which were regular in number and disposition. In colitis, the glycocalyx formed a loose, irregular net, which left the microvilli exposed; the microvilli were less numerous and were irregularly distributed. These alterations may be related to the action of lymphocytes sensitized in the pathogenic process.

2408 THE IMMUNOLOGY OF CHRONIC ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Shorter, R. G.; Tomasi, T. B.; Huizenga, K. A.; Spencer, R. J.; Stobo, J. D. (Mayo Clinic, Rochester, MN 55901). *Ann. N.Y. Acad. Sci.* 278:586-591; 1976.

2409 COLLAGEN POLYMORPHISM IN HUMAN COLON WITH CHRONIC GRANULOMATOUS COLITIS [Abstract]. (Eng.) Seyer, J. M. (Veterans Admin. Hosp., Memphis, TN 38104). *Fed. Proc.* 36(3):680; 1977.

See also, 2102, 2200, 2540.

PANCREAS

10 ABERRANT PANCREAS AND LEIOMYOMA OF THE STOMACH: INDISTINGUISHABLE RADIOLOGIC
D ENDOSCOPIC FEATURES. (Eng.) Perrillo, R. P.;
ckerman, G. R.; Shatz, B. A. (Washington Univ.
h. Medicine, 660 S. Euclid Ave., Saint Louis, MO
110). *Gastrointest. Endosc.* 23(3):162-163; 1977.

Two case reports that demonstrate that aberrant pancreas and leiomyoma of the stomach may produce indistinguishable radiologic and endoscopic features are presented. The first patient, a 54-yr-old asymptomatic woman, was hospitalized after upper gastrointestinal radiography revealed a 2 cm^2 submucosal gastric mass immediately proximal to the angulus on the lesser curvature. Endoscopic examination revealed that the surface was smooth and without central umbilication. Gastric leiomyoma was diagnosed, but wedge biopsy revealed encapsulated aberrant pancreatic tissue. In the second patient, a 30-yr-old woman with postprandial nausea, radiography revealed a small filling defect with a central depression on the greater curvature of the antrum; endoscopic examination revealed a submucosal sessile mass with central umbilication and intact overlying mucosa. This was thought to be aberrant pancreatic tissue, and the mass was snared, electrocoagulated, and retrieved. Histological examination revealed a well-differentiated, nonencapsulated, smooth muscle tumor arising from the muscularis mucosae, with smooth muscle cells interdigitating between the gastric glands. The first case illustrates that caution must be used in the diagnosis of leiomyoma on the basis of "typical" smooth surface and location in the body of the stomach. The second case demonstrates that the feature of a central umbilication occurs also in gastric leiomyoma.

2411 ISOAMYLASES IN PANCREATIC CARCINOMA AND CHRONIC RELAPSING PANCREATITIS.

(Eng.) Skude, G.; Ihse, I. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 12(1): 53-57; 1977.

Pancreatic isoamylase activity in the serum and in duodenal aspirates from 12 control subjects, 7 patients with pancreatic carcinoma, and 13 patients with chronic relapsing pancreatitis was studied. A recently developed electrophoretic technique for the separation of salivary and pancreatic isoamylases was used. Total serum amylase appeared normal in most patients, despite subnormal pancreatic amylase activity in three patients with cancer and in seven patients with pancreatitis. Total duodenal amylase activity was normal in all but one patient who exhibited below normal levels of pancreatic isoamylase activities. Patients with below normal pancreatic serum amylase activities also had very low levels of pancreatic duodenal isoamylases. However, half of the patients with low enzyme levels in the duodenum showed serum activity above the lower normal limit. This may have been due to some remaining ability of the pancreas to secrete or to enzymes flowing into the capillary system from blocked secretory ductuli. Two patients who had normal serum amylase activities showed abnormal isoamylase patterns in both the serum and duodenal aspirates. Serum amylase determination may be an effective test in screening for conditions affecting pancreatic exocrine functions.

2412 ISOLATION OF A GLYCOPROTEIN ANTIGEN FROM ASCITES FLUID OF PANCREATIC CARCINOMA.

(Eng.) Chu, T. M.; Holyoke, E. D.; Douglass, H. O. (Roswell Park Memorial Inst., Buffalo, NY 14263). *Cancer Res.* 37(5):1525-1529; 1977.

A glycoprotein antigen from the ascites fluid of pancreatic carcinoma was isolated with the use of perchloric acid extraction and chromatographies on Sepharose 4B, DEAE-Sephadex, and DE52, followed by Sephadex G-200. This antigen was compared biochemically and immunologically with the carcinoembryonic antigen (CEA). The purified glycoprotein was found to be homogeneous by sodium dodecyl sulfate polyacrylamide gel electrophoresis. A molecular weight of 185,000 daltons was determined by gel filtration. The molecule contained 55% protein and 45% carbohydrate. Both the amino acid and carbohydrate compositions were different from those of CEA. This glycoprotein antigen of pancreatic cancer cross-reacted with CEA; however, the antiserum prepared from this antigen did not react with CEA. The biological significance of this glycoprotein in pancreatic cancer has not yet been determined.

2413 MECONIUM ILEUS EQUIVALENT IN ADULTS WITH CYSTIC FIBROSIS OF PANCREAS: A REPORT OF SIX CASES.

(Eng.) Hodson, M. E.; Mearns, M. B.; Batten, J. C. (Brompton Hosp., London SW3 6HP, England). *Br. Med. J.* 2(6030): 790-791; 1976.

Eleven episodes of meconium ileus equivalent (i.e., intestinal obstruction in cystic fibrosis patients with the obstruction occurring outside the neonatal period) in six patients are reported, and the case reports are presented. The patients ranged in age from 21 to 26 yr. The presenting symptoms included colicky abdominal pain, vomiting, and constipation. Fecal impaction was present in the terminal ileum in all patients and was detected by abdominal radiographs, which showed fluid levels in the small bowel; in some cases the obstruction was detected as a palpable mass in the right iliac fossa. Three patients were initially treated surgically; one died, and the other two developed serious postoperative chest infections. Six episodes were successfully treated medically with acetylcysteine, p.o., and by enema, nasogastric suction, and i.v. fluids. Four patients have been successfully maintained on p.o. acetylcysteamine.

2414 EFFECT OF SECRETIN SNIFF ON EXOCRINE PANCREATIC FUNCTION IN CYSTIC FIBROSIS.

(Ger.) Hottinger, S.; Biland, F.; Bender, S.; Hadorn, B. (Med. Univ.-Kinderklinik und Poliklinik, Inselspital Bern, Freiburgstrasse 23, 3010 Bern, Switzerland). *Praxis* 64(38):1209-1213; 1975.

A report on the long-term administration of secretin in nose drop form to achieve improved fat and nitrogen absorption coefficients, and therefore functiona normalization of the pancreas, in cystic fibrosis is presented. Five children with cystic fibrosis were involved in the study. The patients received porcin secretin and cholecystokinin in physiological NaCl solution for nasal infiltration. Preparations containing well-known fat and nitrogen proportions were fed to the children; quantities not consumed were deducted from the calculated food intake. Pancreozymin-secretin tests and enzyme determinatio were performed to check exocrine pancreatic functio Two 5-day balance periods to establish fat and nitro en absorption coefficients were used, the first as without the administration of secretin, and in ne second, secretin-containing dose drops (187-375 ; approximately 45 U/kg/day) were administered efore meals. An additional check on pancreatic unction in the pancreozymin test consisted of comaring bicarbonate output with chymotrypsin output. ecretin improved the fat digestion in patients with ormal or partially disturbed pancreatic function, n whom the steatorrhea had not exceeded 6 mg/24 hr. n normal control patients, a correlation between oth values was obvious, while in cystic fibrosis, igh bicarbonate secretion persisted despite partialy normal chymotrypsin values. It was found that ecretin promoted bicarbonate and water secretion f the gland and induced a complete rinse-out of nzymes still formed in the pancreas in adequate uantities, leading to a higher total digestive ffect.

415 INHIBITION OF GASTRIC SECRETION IN TREATMENT OF PANCREATIC INSUFFICIENCY. (Eng.) aunders, J. H. B.; Drummond, S.; Wormsley, K. G. Ninewells Hosp., Dundee DD2 1UB, Scotland). r. *Med. J.* 1(6058):418-419; 1977.

ne effects of metiamide inhibition of gastric seretion on the gastric transit of pancreatic enzymes ere studied in patients with pancreatic achylia fter a standard meal supplemented with pancreatic xtract. The duodenal pancreatic enzyme content as measured during a test meal before and after reatment with metiamide (1 g/day). Gastric transit f the enzymes, with the appearance of near-normal mounts in the duodenal contents, occurred only fter metiamide inhibition of gastric secretion and uffering of residual gastric acid with antacids. ne results indicate that gastric inhibition and eutralization of acid are necessary for the satisactory treatment of patients with pancreatic exorine insufficiency but with normal gastric function.

416 EXOCRINE PANCREATIC INSUFFICIENCY AND PRIMITIVE MALNUTRITION. (Eng.) Descos, L.; uclieu, J.; Minaire, Y. (Inserm U 45, Hopital Edouarderriot, F-69374 Lyon Cedex 2, France). *Digestion* 5(1):90-95; 1977.

ancreatic function during secretin stimulation was bserved before and after dietary therapy in four atients suffering from primitive malnutrition. The atients, 37-59 yr old, presented with weakness, uscular atrophy, anemia, low plasma albumin/globulin atios, and weight losses from 9-29% as a result of 3-2 months of inadequate food intake. A high-proteinalorie diet of more than 45 kcal/kg for 4 weeks was dministered. Before dietary therapy, pancreatic flow as below the lower normal limit in only two of our patients (14-49 ml/min), while the maxial bicarbonate concentrations (58-74 mM) and ipase activities (500-860 IU) were always beow the normal limits. Three patients had lowered rypsin activity (16-32 IU), and one patient ad lowered chymotrypsin activity, but all paients had normal amylase activity. Four weeks of therapy greatly improved the maximal bicarbonate concentration (76-110 mM) and lipase activity (760-1,563 IU), but had less and more irregular effects upon pancreatic flow, trypsin, and chymotrypsin activities. The patients also had partial weight recoveries of 0-16%. Pancreatic function appears to recover more quickly from primitive malnutrition than body weight. Furthermore, the maximal bicarbonate concentration and lipase activity are more sensitive to malnutrition, but also more responsive to renutrition, than are pancreatic flow, trypsin and chymotrypsin activities.

2417 EXOCRINE PANCREATIC INSUFFICIENCY SYNDROME IN CBA/J MICE. I. ULTRASTRUCTURAL STUDY. (Eng.) Eppig, J. J.; Leiter, E. H. (Jackson Lab., Bar Harbor, ME 04609). *Am. J. Pathol.* 86(1): 17-30; 1977.

The pathogenesis of a spontaneously occurring exocrine pancreatic insufficiency (EPI) syndrome was studied by electron microscopy in CBA/J mice. The initial cytologic manifestations of this syndrome were seen as a progressive digestion of the zymogen granules, beginning at the periphery and proceeding toward the granule interior. Granule membrane breakdown, fusion of neighboring granules, and a release of zymogen contents into the cytoplasm were frequently observed in later stages; in some cases, the entire granule contents appeared to be digested before membrane breakdown was observed. In either case, pathologic changes were subsequently observed in mitochondria and rough endoplasmic reticulum. Remnants of lysed cells were then engulfed by invading macrophages, and infiltration by fat cells was observed. Secretory ducts and islets of Langerhans showed no pathologic changes, even after total autolysis of the exocrine pancreas. Morphologic evidence showing zymogen granule destabilization, coupled with biochemical evidence, indicate that intracellular autodigestion is the mechanism of exocrine cell death.

2418 EXOCRINE PANCREATIC INSUFFICIENCY SYNDROME IN CBA/J MICE. II. BIOCHEMICAL STUDIES. (Eng.) Leiter, E. H.; Dempsey, E. C.; Eppig, J. J. (Jackson Lab., Bar Harbor, ME 04609). *Am. J. Pathol.* 86(1):31-46; 1977.

Premature activation of proteolytic zymogens (trypsinogen, chymotrypsinogen) as an early step in the pathogenesis of exocrine pancreatic insufficiency (EPI) syndrome was investigated in electrophoresed pancreatic homogenates from CBA/J mice. Polyacrylamide gels containing extracts from control pancreas required prior activation of trypsinogen and chymotrypsinogen to produce activity staining with specific synthetic substrates. Bands of activity staining in gels containing homogenates from mice with EPI syndrome were readily detected without trypsin or enterokinase preincubation. Subcellular fractionation of control and diseased pancreas revealed that the premature intracellular proteolysis was confined to the zymogen granule fraction, which, even in very moderately affected pancreases (10-30% acinar cell autolysis), was very labile *in vitro*. These proteolytic events reflect the biochemical consequences of zymogen granule destabilization that have been observed at the ultrastructural level.

2419 EFFECT OF PANCREATIC ENZYMES AND PEPSIN ON B_{12} BINDING PROTEINS IN BILE [Abstract]. (Eng.) Cotter, R.; Rothenberg, S. P.; Weiss, J. (New York Medical Coll., New York, NY 10029). *Fed. Proc.* 36(3):594; 1977.

2420 IN VITRO STUDIES ON NORMAL AND DISEASED HUMAN EXOCRINE PANCREAS [Abstract]. (Eng.) Adler, G.; Stumpf, A.; Fischer, F.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Stuttgart-Bad Canstadtt, W. Germany). *Scand. J. Gastroenterol.* 11(41):76; 1976.

2421 EXPERIENCES WITH PANCREATECTOMIES [Abstract]. (Eng.) Herzog, K. H. (Surgical Clinic, Wilhelm-Pieck-Univ., Rostock, E. Germany). *Scand. J. Gastroenterol.* 11(41):53; 1976.

2422 TOTAL PANCREATECTOMY (AN ACCOUNT OF 24 CASES). (Eng.) Marchal, G.; Vernette, M. (Centre H.U., Montpellier, France). *Chir. Gastroenterol.* 10(1):105-119; 1976.

2423 TOTAL PANCREATECTOMY FOR CANCER. AN ANALYSIS OF 49 CASES [Abstract]. (Eng.) Lilja, P.; Ihse, I.; Arnesjo, B.; Bengmark, S. (Dept. Surgery, Lund, Sweden). *Scand. J. Gastroenterol.* 11(41):52; 1976.

2424 DIAGNOSIS OF PANCREATIC CANCER. (Eng.) Golematis, B.; Setakis, N.; Hatzitheofilou, C.; Yannopoulos, A. (Medical Sch., Univ. Athens at King Paul's Hosp., St. Thomas St. 17, Athens T. 609, Greece). *Int. Surg.* 61(11/12):609-611; 1976.

2425 HIGH SERUM GLUTAMIC ACID LEVELS IN PATIENTS WITH CARCINOMA OF THE PANCREAS. (Eng.) Castro-Bello, F.; Ramos, F.; Vivanco, F.; Marina-Fiol, C. (Fundacion Jimenez Diaz, Ciudad Universitaria, Av. Reyes Catolicos 3, Madrid 3, Spain). *Digestion* 14(4):360-363; 1976.

2426 INVESTIGATION OF ENZYME THERAPY IN EXOCRINE PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Graham, D. Y. (Baylor Coll. Medicine, Houston, TX). *Clin. Res.* 25(1):17A; 1977.

2427 STEROIDS REVISITED: IS THERE A PLACE FOR STEROIDS IN THE TREATMENT OF PANCREATIC INFLAMMATION [Abstract]. (Eng.) Dreiling, D. A.; Nacchiero, M.; Kaplan, M. (Mt. Sinai Sch. Medicine, City Univ. New York, New York, NY). *Scand. J. Gastroenterol.* 11(41):73; 1976.

2428 ISOTOPIC COMPOSITION OF CATTLE PANCREATIC STONES [Abstract]. (Eng.) Longinelli, A.; Verine, H. J. (Laboratorio di Geologia Nucleare, Univ. Pisa, 56100, Pisa, Italy). *Scand. J. Gastroenterol.* 11(41):85; 1976.

See also, 1775, 2159, 2178, 2179, 2207, 2214, 2215, 2216, 2219, 2220, 2287, 2288, 2317, 2435, 2441, 2463, 2593.

PANCREAS

Pancreatitis

2429 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE EVALUATION OF PANCREATIC DISEASE. (Eng.) Novis, B. H.; Narunsky, L.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 50(39):1501-1505; 1976.

The endoscopic retrograde cholangiopancreatography (ERCP) findings in 98 patients with unexplained abdominal pain or known pancreatitis with recurrent pain are reported, and the results were compared with those of the standard secretin-cholecystokinin test for pancreatic secretory function (PFT). Patients with jaundice were excluded from the study. The radiological findings on ERCP were graded in 38 patients with pancreatitis. Advanced pancreatitis was found in 20 patients (52.5%), moderate changes in 7 (18.4%), and minimal-change pancreatitis in 6 (15.8% Five patients had normal pancreatograms. In 35 patients investigated for unexplained abdominal pain, changes consistent with pancreatitis were found in 7 pancreatic carcinoma in 5, a duodenal ulcer in 2, gallstones in 1, and a duodenal tumour in 1. ERCP demonstrated a normal pancreas in 19 patients. A co parison of the ERCP findings and those of the standard secretin-cholecystokinin pancreatic function test was made in 52 patients. There was a good agre ment between the two tests in the patients with advanced or moderate pancreatitis, as revealed by ERCP but less agreement in the patients with minimal-chan pancreatitis. A few patients with clinical pancreatitis and abnormal ERCP had normal pancreatic function tests. ERCP increases the diagnostic yield in

ents suspected of having pancreatitis and is the
reliable method of diagnosing pancreatic carcin-
not evident by other nonoperative techniques. ERCP
lso useful in the assessment of the severity of
reatitis and is a necessary investigation before
reatic surgery to confirm or exclude cyst forma-
or the site of duct obstruction.

DIAGNOSTIC CONSIDERATIONS IN ACUTE ALCOHOLIC AND GALLSTONE PANCREATITIS. (Eng.)
yan, D.; Simonovitz, D. (Univ. Chicago Pritzker
Medicine, 950 E. 59th St., Chicago, IL 60637).
J. Surg. 132(3):329-331; 1976.

y-six patients with alcoholic acute pancreatitis
compared with 64 patients with proved gallstone
te) pancreatitis to determine additional para-
rs useful in distinguishing these two diseases
ng the acute period. Pain, duration of symptoms,
degree or frequency of hypocalcemia were not
ful in differentiating the two groups. The gall-
e patients had significantly higher mean serum
ase (1,855 ± 0.30 mg/100 ml) levels than the alco-
c patients (807 ± 105 IU, p<0.001; 52 ± 6, p<0.05,
.). Jaundice occurred in 27% of the gallstone
ents and in only 12% of the alcoholic patients.
results demonstrate that the serum amylase level
dmission is one of the most useful laboratory
s in the differential diagnosis of alcoholic and
stone pancreatitis.

STENOSIS OF THE COLON IN ACUTE PANCREATITIS.
(Eng.) Mair, W. S. J.; McMahon, M. J.;
gher, J. C. (The General Infirmary, Leeds, Eng-
). *Gut* 17(9):692-695; 1976.

case of a 79-yr-old woman with a stricture of
colon associated with acute pancreatitis is
ented. The patient presented with a 3-month
ory of anorexia, colicky upper abdominal pain,
ting, loose stools, and low grade fever. A
was felt in the right hypochondrium below a
able enlarged liver. A barium enema examination
losed the stricture, with mucosal destruction
he cecum and ascending colon. At laparotomy,
ss was found in the upper abdomen involving the
reas, the right side of the transverse mesocolon,
the contiguous greater omentum. A biopsy showed
necrosis only. As there appeared to be no actual
owing of the bowel apart from that produced by
a, biopsy of the mass was the only procedure
ied out. The postoperative progress was unevent-
and the abdominal pain, vomiting, and diarrhea
lved. Because many cases of colonic stenosis
ssociation with acute pancreatitis have been
used with carcinoma, both radiologically and at
rotomy, a conservative approach should be adopted
ially, resection being carried out if follow-up
um examination fails to show resolution of the
osis.

ACUTE PANCREATITIS OCCURRING IN HETEROTOPIC PANCREATIC TISSUE IN THE GALLBLADDER.
.) Qizilbash, A. H. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario L8V 1C3, Canada). *Can. J. Surg.* 19(5):413-414; 1976.

The rare case of a 54-yr-old man with acute pancreatitis occurring in heterotopic pancreatic tissue in the gallbladder is presented. The patient presented with acute upper abdominal pain. A cholecystectomy was performed. The inflamed gallbladder measured 7.0 x 4.0 cm. No calculi were present, and histologic sections showed acute cholecystitis. Within the gallbladder wall was a 0.5-cm nodule of pancreatic tissue containing both acinar and ductal elements, together with small islets of Langerhans. Portions of the pancreatic tissue and the adjacent gallbladder wall showed large irregular areas of fat necrosis and, in parts, faintly basophilic necrotic foci involved the muscular and mucosal layers of the gallbladder and the surrounding perimuscular and serosal tissues. This case is unusual because definite evidence of acute inflammation and fat necrosis was demonstrated in the aberrant pancreatic tissue and the adjacent wall of the gallbladder. The occurrence of fat necrosis suggests that pancreatic lipase was released into the gallbladder wall.

2433 ANEURYSMS SECONDARY TO PANCREATITIS. (Eng.) White, A. F.; Baum, S.; Buranasiri, S. (Georgetown Univ. Hosp., 3800 Reservoir Rd., N.W., Washington, DC 20007). *Am. J. Roentgenol.* 127(3): 373-396; 1976.

The arteriograms of 72 unselected consecutive cases of suspected pancreatitis and of 84 cases of carcinoma of the pancreas were reviewed to study the association of aneurysms secondary to pancreatitis. Pancreatitis was confirmed in 63 of the 72 cases. Among the pancreatitis cases, seven were found to have arterial aneurysms involving branches of the peripancreatic vessels; no aneurysms of these vessels were found among the arteriograms of the carcinoma patients. The patients ranged in age from 30 to 69 yr, and the duration of pancreatitis was 4-12 yr. The aneurysms occurred in the splenic (2 cases), common hepatic (1), transverse pancreatic (3), and celiac axis and splenic (1) arteries and were 0.3-2.4 cm in size. The demonstration of aneurysms of the peripancreatic arteries in pancreatitis is an important differential feature from carcinoma of the pancreas.

2434 THE DIAGNOSIS OF CHRONIC PANCREATITIS. MORPHOLOGICAL APPROACH AND NEW CLASSIFICATION BASED ON PANCREATOGRAPHY [Abstract]. (Eng.) Cremer, M.; Toussaint, J.; De Toeuf, J.; Deltenre, M.; Hermanus, A.; Engelholm, L. (Brugmann Hosp., Brussels, Belgium). *Scand. J. Gastroenterol.* 11(41): 35; 1976.

2435 SCREENING TEST FOR PANCREATIC DISEASE [Abstract]. (Eng.) Shimamura, J.; Fridhandler, L.; Berk, J. E. (Dept. Medicine, Univ. California, Irvine, CA). *Clin. Res.* 25(2):112A; 1977.

PANCREAS

2436 PANCREATITIS TREATED BY AZOTHIOPRINE [Abstract]. (Eng.) Kerstein, M. D.; Grabman, J. P. (Yale Univ. Sch. Medicine, West Haven, CT). *Clin. Res.* 24(5):628A; 1976.

2437 SOMATOSTATIN THERAPY OF ACUTE EXPERIMENTAL PANCREATITIS [Abstract]. (Eng.) Lankisch, P. G.; Koop, H.; Winckler, K.; Folsch, U. R.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Scand. J. Gastroenterol.* 11(41): 49; 1976.

2438 ACUTE PANCREATITIS: NUTRITIONAL ASPECTS IN VERONA COUNTRY [Abstract]. (Eng.) Angelini, G.; Cavallini, G.; Vantini, I.; Rosa, B.; Adamo, S.; Zuniga, G.; Scuro, L. A. (Clinica Medica III, Universita di Padova, Padova, Italy). *Scand. J. Gastroenterol.* 11(41):77; 1976.

2439 NUTRITIONAL ASPECTS OF CHRONIC RELAPSING PANCREATITIS (CRP) IN VERONA COUNTRY [Abstract]. (Eng.) Vantini, I.; Cavallini, G.; Angelini, G.; Piubello, W.; Bovo, P.; Benini, L.; Ederle, A.; Scuro, L. A. (Instituto di Clinica Medica III, Universita di Padova, Padova, Italy). *Scand. J. Gastroenterol.* 11(41):43; 1976.

2440 QUANTITY OF ALCOHOL CONSUMPTION AND RISK OF CHRONIC PANCREATITIS [Abstract]. (Eng.) Sarles, H.; Cros, R. C.; Nicolas, R.; Durbec, J. P. (INSERM 46, chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(41):45; 1976.

2441 MORPHOLOGIC EVIDENCE OF CYTOLOGIC DAMAGE TO THE PANCREATIC PARENCHYMA IN ALCOHOLICS: PRELIMINARY OBSERVATIONS [Abstract]. (Eng.) Bordalo, O.; Concalves, D.; Noronha, M.; Dreiling, D. A. (Faculties of Medicine and Surgery, Lisbon, Portugal). *Scand. J. Gastroenterol.* 11(41):78; 1976.

2442 CHRONIC RELAPSING PANCREATITIS [Abstract]. (Eng.) Trapnell, J. E. (Royal Victoria Hosp., Boscombe, Bournemouth, England). *Scand. J. Gastroenterol.* 11(41):44; 1976.

2443 PATHOLOGY OF CHRONIC CALCIFYING PANCREATITIS. (Eng.) Sarles, H.; Sahel, J. (INSERM, 46 Chemin de la Gaye, 13009 Marseilles, France). *Am. J. Gastroenterol.* 66(2):117-139; 1976.

2444 INITIATING FACTORS OF CHOLESTEROL GALLSTONES AND PANCREATITIS. (Eng.) Tanimura, H.; Shioda, R.; Muroya, H.; Takenaka, M.; Nagase, M. (Kyoto Univ., Medical Sch., Sakyo-ku, Kyoto, Japan). *Arch. Jpn. Chir.* 45(1):3-16; 1976.

2445 GALLSTONE PANCREATITIS WITH NORMAL BILIARY RADIOLOGY. (Eng.) Smith, R.; Williams, R.; Cotton, P. B. (St. George's Hosp., London, England). *Br. J. Surg.* 63(11):861-863; 1976.

2446 BILE ACIDS PATTERN IN DUODENAL FLUID IN CHRONIC PANCREATITIS [Abstract]. (Eng.) Gaidano, G.; Cavanna, A.; Molino, G.; Boccuzzi, G.; Avagnina, P. (Ospedale San Vito, Torino, Italy). *Digestion* 14(5/6):513-514; 1976.

2447 PANCREATITIS AND JUXTA-PAPILLAR DUODENAL DIVERTICULA--A STUDY OF THE SPHINCTER FUNCTION [Abstract]. (Eng.) Lotveit, T.; Aune, S.; Osnes, M. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(41):46; 1976.

See also, 1962, 2106, 2161, 2162, 2178, 2218, 2221, 2317, 2411, 2416, 2420, 2421, 2422, 2433.

LIVER AND BILIARY TRACT

2448 ABNORMAL REGULATION OF PLASMA PYRIDOXAL 5'-PHOSPHATE IN PATIENTS WITH LIVER DISEASE. (Eng.) Mitchell, D.; Wagner, C.; Stone, W. J.; Wilkinson, G. R.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Gastroenterology* 71(6):1043-1049; 1976.

The effects of liver disease on the regulation of plasma pyridoxal 5'-phosphate (PLP) were studied in six healthy controls, eight patients with alcoholic cirrhosis, six patients with acute hepatitis, and three patients with extrahepatic obstruction. The plasma PLP level was measured before and sequentially after the rapid i.v. administration of 50 mg of pyridoxine. The base line plasma PLP concentration was significantly lower in cirrhotic patients than in normal persons ($p<0.025$), and there was a tendency for it to be reduced in patients with extrahepatic obstruction. After the administration of pyridoxine, there was a significant increase in the plasma PLP level over a 2- to 12-hr period, after which the concentration returned gradually toward the initial value. The area under the concentration/time curve was 2-8 times smaller ($p<0.002$) in the patients with liver disease than in controls. To assess possible mechanisms of this change, 5 mg PLP were adminisred i.v. to the patients, and the pharmacokinetics the disposition were assessed. The initial and eady state volumes of distribution of PLP were mparable in cirrhotics and controls ($p<0.05$), but e clearance of plasma PLP in cirrhotics was much ster (63.0 ± 7.4 versus 31.7 ± 2.7 ml/min, $p<0.004$). milar findings were obtained in the other liver sease subjects. The *in vitro* plasma binding of PLP supracirculatory concentrations was comparable in rrhotics and controls (99.4 versus 99.5%, $p<0.05$). ese studies show that: plasma PLP regulation in tients with liver disease is abnormal and that a gnificant factor in the decrease in plasma PLP ter i.v. pyridoxine administration in these patients pears to be an increase in the total plasma clearce of the coenzyme; it is postulated that this may due to increased degradation of PLP by the dissed liver.

49 METRONIDAZOLE AND HEPATIC ABSCESS: A FALSE-POSITIVE RESPONSE. (Eng.) Kane, G.; Fossieck, B. E., Jr.; Parker, R. H. (Veterans min. Hosp., 50 Irving St. NE, Washington, DC 422). *JAMA* 236(23):2653-2654; 1976.

e case of a patient with a false-positive response metronidazole therapy for amebic hepatic abscess presented. The patient, a 46-yr-old man, esented with fever, weight loss, diarrhea, and termittent abdominal pain. He had been treated r amebic dysentery 31 yr previously, and hepatic scess was diagnosed on the basis of the results ^{99m}Tc sulfur colloid scan and selective celiac giography. He was treated with metronidazole 50 mg t.i.d., p.o.). Within 12 hr, the patient's mperature fell from 40 C to 37.2 C, and for the xt 7 days it remained below 37.8 C. On the sevth day, his temperature rose to 40 C; emetine drochloride caused a reduction in temperature r 3 days. At this time, amebic antibody titers complement fixation and indirect hemagglutination sts were nonreactive. Chloramphenicol therapy s begun in place of emetine and metronidazole. ploratory laparotomy revealed a hepatic abscess, d extensive microscopic examination of the purunt fluid failed to show *Entamoeba histolytica*. am-positive cocci and gram-negative rods were esent. Aerobic cultures were sterile, and aerobic cultures were positive for microaerophilic reptococci. The patient recovered after continued loramphenicol therapy. The authors believe that is case represents a response to metronidazole susceptible anaerobes involved in the etiology of e abscess.

50 HEREDITARY CHOLESTASIS COMBINED WITH PERIPHERAL PULMONARY STENOSIS AND OTHER ANOMIES. (Eng.) Henriksen, N. T.; Langmark, F.; Sornd, S. J.; Fausa, O.; Landaas, S.; Aagenaes, O. lleval sykehus, Oslo, Norway). *Acta Paediatr. and.* 66(1):7-15; 1977.

e cases of six patients with a hereditary form of olestasis that showed a marked resemblance to rteriohepatic dysplasia" are presented. The paents were followed for 12 yr. All patients were smaller than average at birth, and all except one boy showed neonatal cholestasis and hepatomegaly. Itching persisted for many years, especially in two boys, 11 and 12 yr old. High bilirubin levels, enlarged livers, and hyperlipemia were common in infancy, but tended to normalize with age. Steatorrhea was more predominant in infancy and persisted only in one girl, suggesting that the intestinal function of the bile acids was usually not affected. The serum concentrations of alkaline phosphatase increased with age to higher than normal levels, and alanine- and aspartate-aminotransferases were also increased in all but one girl. Bile acids appeared normal, but their serum concentrations were increased in all but one patient. Liver biopsies revealed greatly reduced numbers of bile ducts in the portal areas and obstructions of the bile capillaries, particularly in infancy, with resultant accumulation of bile pigment in the hepatocytes and inflammation of the portal areas. These observations suggest that defective metabolism or transport of bile acids may be responsible for liver dysfunction. Other characteristics of the syndrome are peripheral pulmonary stenosis, atypical faces with deep-set eyes, broad forehead, flat profile, and vertebral anomalies. Growth retardation was observed in several cases and appeared to be related to the degree of liver dysfunction. Family data suggested an autosomal dominant mode of inheritance.

2451 STUDIES IN CHOLESTASIS OF PREGNANCY. VI. FATTY ACID COMPOSITION OF GLYCERO-PHOSPHOLIPIDS BEFORE AND AFTER DELIVERY. (Eng.) Samsioe, G.; Johnson, P.; Gustafson, A. (Sahlgren's Hosp., Goteborg, Sweden). *Acta Obstet. Gynecol. Scand.* 56(1):31-35; 1977.

The disappearance of lipoprotein X (LP-X) was followed in eight women with cholestasis of pregnancy (CP), and the characteristic fatty acid pattern of serum lecithin was studied before and a few days after delivery. Ten women with an uncomplicated pregnancy served as controls. During pregnancy, all patients with CP had LP-X in their serum; LP-X had disappeared by 4-8 days after delivery in all women. In the women with CP, the mean fatty acid composition of lecithin showed the following changes after delivery: palmitic acid, 16:0 ($p<0.05$); linoleic acid, 18:2 ($p<0.01$). Stearic acid (18:0) and oleic acid (18:1) levels were higher after delivery. The concentration of serum lecithin was also lower after delivery ($p<0.01$). In the controls, the lecithin composition after delivery was lower in palmitic acid (16:0) and higher in stearic acid (18:0).

2452 TREATMENT OF HEPATIC COMA WITH HEMOPERFUSION THROUGH POLYACRYLAMIDE HYDROGEL-COATED CHARCOAL. (Eng.) Gelfand, M. C.; Knepshield, J. H.; Cohan, S.; Ramirez, B.; Schreiner, G. E. (Georgetown Univ. Hosp., 3800 Reservoir Rd. NW, Washington, DC 20007). *Kidney Int.* 10(Suppl. 7): S239-S243; 1976.

The case of a patient with severe hepatic coma who was treated with hemoperfusion through polyacrylamide hydrogel-coated charcoal is presented. The patient, a 34-yr-old man with an 18-yr history of alcohol abuse, was admitted in grade IV coma with a serum bilirubin level of 19.2 mg/100 ml, and SGOT level of 159 U, abnormal clotting indices, guaic-positive stools, and pyrexia. He responded minimally to pain, the pupils responded sluggishly to light, and Babinski reflexes and Doll's eye movements were present. There was no evidence of ascites. The length of the liver by percussion was less than 5 cm in the midclavicular line. He responded minimally to bowel sterilization and treatment with thiamine, multivitamins, phytonadione, potassium, and 4 U of plasma. After approximately 2 hr of hemoperfusion, the patient became responsive to painful stimuli. The pupils became more dilated and reacted promptly to light. Doll's eye movements were no longer present. Within 2 hr of termination of the 4-hr perfusion, the patient returned to grade IV coma. Transfusion with fresh frozen plasma and platelet packs improved the clotting indices. Approximately 24 hr after a second 4-hr perfusion, the patient regained full consciousness. He remained conscious for the next 7 days, at which time his condition was complicated by massive gastrointestinal bleeding, renal failure, and adult respiratory distress syndrome. He again became comatose, but regained full consciousness by a third hemoperfusion. The clotting indices continued to drop, however, and the patient died from uncontrolled upper gastrointestinal tract bleeding complicated by refractory hypotension and oliguria. Serum calcium dropped during hemoperfusion, but were easily restored. Hypotension occurred at the initiation of hemoperfusion, but was reversible with volume replacement. The most serious complication of this procedure was significant decreases in platelet counts, probably due to damage to platelets passing over the coated charcoal. Hemoperfusion may be valuable in the treatment of acute or chronic hepatic failure.

2453 TEMPORARY LIVER TRANSPLANTATION IN ACUTE LIVER FAILURE.

(Eng.) Diaz, A.; Ricco, J. B.; Franco, D.; Gigou, M.; Szekely, A. M.; Bismuth, H. (No affiliation given). *Arch. Surg.* 112(1): 74-78; 1977.

The use of temporary liver transplantation for supporting life during acute liver failure was investigated in mongrel dogs. Acute hepatic failure was produced in 15 dogs by temporary suppression of the entire hepatic blood inflow for 60 min. Nine dogs received an intrathoracic hepatic homograft concurrently. The mean survival time for dogs not receiving transplants was 21 hr (range, 10-28 hr) from beginning of ischemia. The mean survival time for dogs receiving transplants was 7 days (range, 32 hr to 25 days) after the beginning of ischemia. Thus, there was a significant ($p<0.001$) difference between the mean survivals of transplanted and nontransplanted dogs. In dogs undergoing intrathoracic hepatic transplantation, the levels of SGPT and fibrinogen and the prothrombin time returned to normal or near normal within 5 days and were approximately 400 mU/ml, 3.5 g/l, and 15 sec, resp., at that time. In four animals receiving transplants, the graft was removed on the 5th postoperative day, and two of those survived for 10 and 25 days following graft removal and died from unrelated causes (pneumonitis and wound dehiscence). These results demonstrate that a temporary heterotopic liver transplant is able to support life during the acute and normally lethal phase of massive liver necrosis in dogs.

2454 PROGNOSTIC VALUE OF SERUM ALPHA-FETOPROTEIN IN FULMINANT HEPATIC FAILURE INCLUDING PATIENTS TREATED BY CHARCOAL HAEMOPERFUSION.

(Eng.) Murray-Lyon, I. M.; Orr, A. H.; Gazzard, B.; Kohn, J.; Williams, R. (Charing Cross Hosp., London W6, England). *Gut* 17(8):576-580; 1976.

Serum α-fetoprotein (AFP) levels were measured sequentially by a radioimmunoassay method in 64 patients with fulminant hepatic failure to determine the prognostic value of AFP. In 15 of the 64 patients (23%), AFP levels were raised, but in only two did they exceed 500 ng/ml. Of the 23 survivors, 11 (48%) had raised AFP levels, compared with 4 of the 41 (9.8%) fatal cases ($p<0.005$). This rise in AFP levels was found early after the development of grade IV coma and constitutes an encouraging prognostic sign at a time when the liver function tests and EEG are unhelpful. A radioimmunoassay must be used if these small, but significant, rises in plasma concentration are to be detected. Twelve patients survived without showing a rise in plasma AFP at any time during the illness. The four fatal patients, who had raised AFP levels, all had serious complications of fulminant hepatic failure. Charcoal hemoperfusion did not increase the survival of six AFP-negative patients in whom this procedure was carried out.

2455 HEPATIC LESIONS OF CENTRAL PERICELLULAR FIBROSIS IN MORBID OBESITY, AND AFTER JEJUNOILEAL BYPASS.

(Eng.) Marubbio, A. T., Jr.; Buchwald, H.; Schwartz, M. Z.; Varco, R. (Hennepin County Medical Center, Fifth St. and Portland Ave. South, Minneapolis, MN 55415). *Am. J. Clin. Pathol.* 66(4):684-691; 1976.

Histologic findings in liver biopsy specimens obtained from 88 patients before and 1 and 2 yr after end-to-end jejunoileal bypass were compared. In addition to the expected fatty changes, mild changes of centrilobular, pericellular fibrosis were present in the initial biopsies in 8.6%; 1 yr later, these changes were apparent in 46%. Portal-central bridging developed in 6.8% of the patients; early micronodular cirrhosis developed in 3.4% of these patients, all of whom had central pericellular fibrosis. Electron microscopy of prebypass liver biopsies from eight additional patients showed collagen and electron-dense material resembling basement membranes within the spaces of Disse in seven, although only four had light microscopic evidence of minimal central pericellular fibrosis. The existence of these light and electron microscopic changes before jejunoileal bypass suggests that there is a lesion in morbid obesity that may be exacerbated during the first year after operation.

2456 BIOPSY STUDY OF HEPATOCARCINOMAS IN NIGERIAN IGBOS.

(Eng.) Onuigbo, W. J. B. (General Hosp., P.M.B. 1030, Enugu, Nigeria). *Acta Hepatogastroenterol.* 24(1):24-26; 1977.

The clinical factors, histologic appearance, sex distribution, and age distribution of 55 cases of hepatocarcinoma among Nigerian Igbos were studied. The male:female ratio was 2.9:1, and the average age peak was 20-49 yr. Symptoms included abdominal swelling (41 cases), abdominal pain (25), weight loss (16), and jaundice (10). The liver was palpable in almost all patients. Two patients presented acutely with hemoperitoneum due to rupture of a necrotic tumor nodule. Cirrhosis was found in 60% of 20 biopsy specimens. The age peak for hepatocarcinoma among the Igbos is younger than that reported in the U.S., Argentina, and Great Britain. The large proportion of patients presenting with an abdominal mass is also noteworthy. In addition, the incidence of hemoperitoneum is higher in Africans.

2457 SOLITARY HEPATIC HEMANGIOMA IN A NEWBORN INFANT COMPLICATED BY CARDIAC FAILURE, CONSUMPTION COAGULOPATHY, MICROANGIOPATHIC HEMOLYTIC ANEMIA, AND OBSTRUCTIVE JAUNDICE. CASE REPORT AND REVIEW OF THE LITERATURE.

(Eng.) Linderkamp, O.; Hopner, F.; Klose, H.; Riegel, K.; Hecker, W. C. (Universitats-Kinderklinik, Lindwurmstr. 4, D-8000 Munchen, W. Germany). *Eur. J. Pediatr.* 124(1):23-29; 1976.

The case of a newborn infant with a large hepatic hemangioma, congestive heart failure, consumption coagulopathy, microangiopathic hemolytic anemia, and obstructive jaundice is presented. The patient was mildly heparinized (250 U/kg/day) and underwent successful resection of the tumor without lobectomy at the age of 3 days. Blood volume increased from 93.9 ml/kg at the age of 5 hr to 124.2 ml/kg prior to surgery. RBC mass simultaneously decreased from 53.8 to 39.4 ml/kg. The increase of blood volume is explained by congestive heart failure, the decrease of RBC mass is explained by intravascular coagulation within the tumor, resulting in formation of thrombi and microangiopathic hemolytic anemia. A review of the literature on infants with symptoms caused by an intrahepatic hemangioma during the first month of life confirms that surgical intervention is the treatment of choice for infants with giant solitary liver hemangioma.

2458 HEMANGIOENDOTHELIOMATOSIS OF THE LIVER: A 12-YEAR FOLLOW-UP.

(Eng.) Chowdhury, A. R.; Black, M.; Lorber, S. H.; Chey, W. Y. (St. Joseph Hosp., 12th and Walnut St., Reading, PA 19603). *Gastroenterology* 72(1):157-160; 1977.

The case of a 43-yr-old woman with hepatic hemangioendothelioma associated with hepatomegaly and ascites who has been followed for over 12 yr is presented. The patient presented with a 5-month history of increasing abdominal girth and occasional nausea. She consumed approximately 1 quart of whiskey daily and had been exposed to the vapors of organic solvents, including carbon tetrachloride, for 20 yr. The diagnosis of hemangioendotheliomatosis of the liver with considerable fibrosis was made by a wedge biopsy. During the past decade, attempts to discontinue diuretic therapy have resulted in a return of ascites and marked oliguria. On a maintenance diet of 6 g of sodium and omission of diuretics for 2 weeks, plasma renin activity was 1,668 ng/100 ml, and urinary aldosterone excretion was 24 μg/day. Portal hypertension together with secondary aldosteronism were presumably responsible for the formation of ascitic fluid, but the pathophysiological mechanism remains obscure. The patient has remained well on a salt-restricted diet, furosemide, and spironolactone. The relatively benign history of this patient, together with the static liver size, suggest that her hepatic lesions have not grown significantly over the past 12 yr.

2459 HEMOBILIA FOLLOWING NEEDLE BIOPSY OF THE LIVER.

(Eng.) Seltzer, R. A.; Rossiter, S. B.; Cooperman, L. R.; Liebowitz, D. (Sequoia Hosp., Redwood City, CA 94062). *Am. J. Roentgenol.* 127(6):1035-1036; 1976.

An angiographically documented case of hemobilia following liver biopsy in which the bleeding resolved spontaneously is presented. Four days after liver biopsy (which showed chronic viral hepatitis), the patient, a 24-yr-old man, experienced sudden, right upper quadrant and epigastric pain, followed by melena. Four units of blood were required over the next 5 days to maintain the blood hemoglobin. The bilirubin was 8.0 mg/100 ml at the onset of pain, but decreased to 2.7 mg/100 ml when the bleeding subsided. Twelve days after the biopsy, there was an identical episode of epigastric pain, hematemesis, and melena, with an elevation in serum bilirubin and drop in hemoglobin. Twenty-one days after the biopsy, celiac arteriography showed extravasation from a branch of the right hepatic artery into a branch of the right hepatic duct. A third mild episode of hemobilia 3 weeks later subsided with bed rest, and no further bleeding has occurred in the ensuing 6 months. Although uncommon, hemobilia should be considered as a cause of gastrointestinal hemorrhage in a patient who has had a recent liver biopsy.

2460 FOCAL NODULAR LIVER HYPERPLASIA.

(Por.) Pereira-Lima, L.; Miguel, P. R.; Nestrovski, M.; Geyer, G. (Dep. de Cir. da Pont. Univ. Catol. do Rio Grande do Sul, Rio Grande, Brazil). *Rev. Assoc. Med. Bras.* 21(8):237-238; 1975.

A differential diagnosis study is presented based on histopathological findings in two cases of benign tumors of the liver discovered during surgery for duodenal ulcer. In a 39-yr-old woman, laparotomy revealed three yellowish nodular masses in the right lobe of the liver, having a multilobular aspect, a firm consistency, and a superficial location. Following resection of the tumor, the patient experienced recurrent abscesses and septicemia. She was operated three more times then released in good condition 115 days after surgery. One month later, a hepatic scintiscan with ^{113}In revealed a normal aspect of the liver. A 47-yr-old woman subjected to vagotomy and gastroenteroanastomosis had a nodular, cuneiform grayish mass located in the right lobe of the liver. The histological examination of paraffin embedded bioptic specimens determined the diagnosis of focal nodular hyperplasia of the liver (FNHL) in both patients. In stressing the pathogenetic difference between FNHL and true adenomas, at macroscopic examination, FNHL shows one or more areas of fibrosis of stellate shape, which are not found in adenomas. At microscopy the adenoma shows mostly undifferentiated cells without a trace of biliary ducts or portal spaces, while FNHL shows cellular aspects similar to those of the normal liver. It is suggested that the term "FNHL" is preferred to that of hamartoma,, since it better indicates the evolutionary, rather than the congenital, nature of the tumor.

2461 THE NEPHROGENIC HEPATIC DYSFUNCTION SYNDROME. A REVIEW. (Eng.) Strickland, R. C.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37203). *Am. J. Dig. Dis.* 22(1):49-55; 1977.

The literature on the nephrogenic hepatic syndrome (NHDS) is reviewed. Patients with renal cell carcinoma occasionally develop hepatomegaly and abnormal liver function tests in the absence of hepatic metastases. This condition is reversible with nephrectomy. Since its discovery in 1961, 29 fully documented cases of this syndrome have been published.
Based on these cases, the syndrome is usually characterized by hepatomegaly, fever, anemia, weight loss, high levels of alkaline phosphatase, prolonged prothrombin time, and abnormal BSP retention. No consistent patterns of histology appear in either renal cell carcinomas or livers associated with the syndrome. Several theories exist as to the etiology of some of the common symptoms. Elevated alkaline phosphatase may be caused by the production of a variant, Regan isoenzyme, by the carcinoma. Regan isoenzyme has been associated with certain other neoplastic tissues, but only two patients with NHDS have been tested, and its presence was detected in only one of these. It has also been suggested that fever may be the major cause of abnormal BSP retention, since this symptom can be induced by pyrexia caused by two very different agents, endotoxin and etiocholanolone. An unsupported, but possible, explanation for NHDS was that the syndrome might be caused by liver metastases that regressed after the primary carcinoma was removed and were, therefore, not detected. Another, so far unsupported, possibility is that the carcinoma may produce a "toxic hormone," which causes liver dysfunction. A more complete understanding of this syndrome will make possible more accurate diagnoses of patients with unexplained liver dysfunctions.

2462 TOXIC ENCEPHALOPATHY AND FATTY ACCUMULATIONS IN THE VISCERA (REYE'S SYNDROME). (Spa.) Cordero, J.; Olivos, P.; Zacarias, J.; Latorre, J. J. (Hospital Luis Calvo MacKenna, Chile). *Rev. Chil. Pediatr.* 45(6):483-490; 1975.

Experience with eight cases of Reye's syndrome with marked prodromal symptomatology (vomiting, fever, convulsions) is reviewed. Physical development was normal, except in one undernourished patient, 48 months old. Fevers and fluctuating pulses with respiratory disorders also occurred. Abdominal symptomatology of hepatomegaly appeared more frequently (7 cases) than did hematemesis (4) and melena (2). Nonsystematized neurological symptoms were convulsions (5), hypotensive coma, hypertension, and decerebration (3 cases); there were six deaths within 13-72 hr. Hematological and serological examinations revealed low prothrombin, leukocytosis, and hyperglutaminemia, indicating hepatic insufficiency and uremia. Pathological anatomy was nonspecific; cerebral edema with congestion and extravascularization, fatty liver, infiltrated renal tubules, and bronchopneumonia were seen. Convulsions called for pheonobarbital sodium (10 mg/kg, i.m.) or diazepam (0.5 mg/kg, i.m.). Neomycin and exchange blood transfusion were given for hepatic insufficiency with increased glutamic-pyruvic transaminase. Glucose solutions were used in i.v. hydration. The two survivors had altered electroencephalograms after 100 days with subsequent normalization of hepatic structures.

2463 HEPATIC DYSFUNCTION IN ASSOCIATION WITH PANCREATIC INSUFFICIENCY AND CYCLICAL NEUTROPENIA: SHWACHMAN-DIAMOND SYNDROME. (Eng.) Brueton, M. J.; Mavromichalis, J.; Goodchild, M. C.; Anderson, C. M. (Inst. Child Health, Univ. Birmingham, Francis Rd., Birmingham B16 8ET, England). *Arch. Dis. Child.* 52(1):76-78; 1977.

The results of investigations on four children with the syndrome of pancreatic achylia and cyclical neutr penia (Shwachman-Diamond syndrome) are presented, together with the complete case history of one child with clinical evidence of hepatic dysfunction in association with this syndrome. The patient whose case report is presented is a boy who was first seen at the age of 9 months. Steatorrhea (46.2 mmol fat/24 hr) was present. After stimulation of the pancreas with pancreozymin, no trypsin appeared in the duodenal juice, and the lipase level was very low (0.25 U/0.1 ml). The neutrophil level was 0.18-9.96 x 10^9/1. Skeletal abnormalities included rib and expansion and metaphyseal dysostosis. Immunological studies showed normal IgG levels, but reduced IgM (0.07 g/1) and only a trace of IgA. A needle liver biopsy taken at 2 yr showed variation in size of the hepatocytes and expansion of the portal tracts due to the presence of reticulin fibers. Among the other three cases, rib end expansion was present in one, metaphyseal dysostosis in two, and clinodactylyl hypoplasia in one. The serum IgA levels were 0.18, 5.8, and 0.54 g/1 in the three patients, resp; IgM levels were 0.78, 0.29, and 0.37, resp., and IgG levels were 3.8, 16.0, and 3.8 g/1, resp. All four patient were below the third centile in height and weight. This study illustrates the broad spectrum of the Shwachman-Diamond syndrome, and supports the contention that hepatic involvement should be regarded as a feature of the syndrome.

2464 VENO-OCCLUSIVE DISEASE OF THE LIVER AFTER CHEMOTHERAPY OF ACUTE LEUKEMIA: REPORT OF TWO CASES. (Eng.) Griner, P. F.; Elbadawi, A.; Packman, C. H. (Univ. Rochester Sch. Medicine and Dentistry, 601 Elmwood Ave., Rochester, NY 14642). *Ann. Intern. Med.* 85(5):578-582; 1976.

Two fatal cases of veno-occlusive disease of the liver after treatment of acute leukemia with cytosine arabinoside and 6-thioguanine are presented. In both patients (a 17-yr-old boy and a 74-yr-old man), upper right quadrant pain was preceded by anorexia, followed by the development of an enlarged tender liver, ascites, and evidence of collateral venous flow. The first patient had received 10 weeks of thioguanine and cytosine arabinoside treatment for acute myelomonocytic leukemia, and the second patient had been treated for acute myeloblastic leukemia for 12 weeks. The first patient also received daunomycin, vincristine, and cyclophosphamide; the only other drugs administered to the second patient were digoxin, fluazepam, and acetaminophen. Liver dysfunction was relatively mild. Antemortem and postmortem specimens of the liver showed changes characteristic of toxic veno-occlusive disease (i.e., a nonthrombotic, sclerotic, occlusive lesion of small hepatic veins, with congestion of related hepatic sinusoids, and commensurate atrophy of hepatic parenchyma). Neither the clinical syndrome nor the histologic features were consistent with the hepatic complications observed in acute leukemia. Similar findings have been described after the ingestion of certain plant alkaloids and after treatment with arsphenamine, urethane, and ionizing radiation to the liver. Since cytosine arabinoside and 6-thioguanine were the only agents received by both patients and because mild disturbances of liver cell function occasionally follow treatment with either agent, the cause of the hepatic lesions is thought to be one of these agents. The authors believe that 6-thioguanine is most likely responsible.

2465 ACUTE INTRAVASCULAR HEMOLYSIS AND ACUTE LIVER FAILURE ASSOCIATED AS A FIRST MANIFESTATION OF WILSON'S DISEASE. (Eng.) Roche-Sicot, J.; Benhamou, J. P. (Hopital Beaujon, 92110 Clichy, France). *Ann. Intern. Med.* 86(3):301-303; 1977.

The cases of three patients in whom the first manifestation of Wilson's disease was a syndrome in which acute intravascular hemolysis and acute liver failure were associated are presented. The patients included an 8-yr-old girl, a 13-yr-old boy, and a 15-yr-old girl. The syndrome developed in three periods; the first, lasting 3-14 days, was characterized by fatigue, fever, and jaundice; the second, lasting 1 or 2 days, was characterized by severe, acute intravascular hemolysis; and the third, lasting 2-6 days, was characterized by hepatic encephalopathy. All patients died from liver failure 7-21 days after the onset of the syndrome. The diagnosis of Wilson's disease was based on the presence of Kayser-Fleischer rings, the low value for ceruloplasmin (2-9 mg/dl), and the high value for hepatic copper (150-307 μg/g dry weight) in all three patients. The diagnosis of acute intravascular hemolysis was based on the sudden development of anemia, the high value for the reticulocyte count (195,000-450,000/mm^3), the absence of demonstrable bleeding, unconjugated hyperbilirubinemia, and the presence of hemoglobin in serum and urine. Hemolysis did not result from glucose-6-phosphate dehydrogenase deficiency or from autoantibodies, because the activity for that enzyme was normal, and the direct Coombs' test was negative. The syndrome of acute intravascular hemolysis and acute liver failure can be regarded as a characteristic manifestation of Wilson's disease.

2466 HEPATIC COPPER CONTENT, URINARY COPPER EXCRETION, AND SERUM CERULOPLASMIN IN LIVER DISEASE. (Eng.) Ritland, S.; Steinnes, E.; Skrede, S. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(1):81-88; 1977.

Sixty-six patients, previously diagnosed as having other liver disorders, were screened for Wilson's disease. Increased hepatic copper content (>250 μg/g dry weight) was observed in 8 of 13 patients with primary biliary cirrhosis, but only normal or slightly elevated copper levels were present in other forms of cirrhosis, as well as acute hepatitis, steatosis of the liver, hepatic amyloidosis, hemochromatosis, and Gilbert's syndrome. Increased urinary copper excretion appeared more randomly among the various disorders in 14 patients, 6 of whom had normal liver copper concentrations. None of the patients had reduced plasma ceruloplasmin, and high ceruloplasmin levels were observed in almost all of the patients with significantly increased (>250 μg/g dry weight) hepatic copper concentrations. High levels were also associated with acute hepatitis, nonbiliary cirrhosis, and occasionally, with chronic active hepatitis. None of the liver disorders exhibited the combination of criteria frequently associated with Wilson's disease: low plasma ceruloplasmin levels, increased hepatic liver concentration, and high levels of urinary copper excretion.

2467 AMINOPYRINE DISPOSITION: STUDIES ON BREATH, SALIVA, AND URINE OF NORMAL SUBJECTS AND PATIENTS WITH LIVER DISEASE. (Eng.) Hepner, G. W.; Vesell, E. S. (Harbor General Hosp., Torrance, CA 90509). *Clin. Pharmacol. Ther.* 20(6):654-660; 1976.

2468 PROCOLLAGEN TYPE I AND III IN LIVER DISEASE [Abstract]. (Eng.) Brunner, H.; Penner, E.; Wick, G. (Ordinariat fur Gastroenterologie, Vienna, Austria). *Digestion* 14(5/6):500; 1976.

2469 ORCEIN POSITIVE HEPATOCELLULAR MATERIAL IN LONG-STANDING BILIARY DISEASES. II. ULTRASTRUCTURAL STUDIES. (Eng.) Sipponen, P. (Central Lab. Pathology, Univ. Helsinki, Haartmaninkatu 3, SF-00290 Helsinki 29, Finland). *Scand. J. Clin. Lab. Invest.* 36(4):553-557; 1976.

2470 THE CLINICAL PRESENTATION OF PYOGENIC LIVER ABSCESS. (Eng.) Young, A. E. (St. Thomas's Hosp. Medical Sch., London, England). *Br. J. Surg.* 63(3):216-219; 1976.

2471 H_2-RECEPTOR ANTAGONISTS IN PROPHYLAXIS AND CONTROL OF BLEEDING IN LIVER DISEASE [Abstract]. (Eng.) MacDougall, B. R. D.; Bailey, R. J.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Digestion* 14(5/6):465; 1976.

2472 METASTATIC CANCER OF THE LIVER: RETROSPECTIVE ANALYSIS OF THE CLINICAL FEATURES IN 166 PATIENTS WITH DISCUSSION ON THE POSSIBILITY OF EARLY DIAGNOSIS. (Eng.) Van Waes, L.; Demeulenaere, L.; Van Holder, R.; Van Maele, V. (Mount Sinai Sch. Medicine, West Kingsbridge Rd., Bronx, NY 10468). *Acta Gastroenterol. Belg.* 39(7/8):236-250; 1976.

2473 INSULIN, GLUCAGON, AMINOACID IMBALANCE, AND HEPATIC ENCEPHALOPATHY. (Eng.) Soeters, P. B.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA 12114). *Lancet* 2(7991):880-882; 1976.

2474 INTRAPULMONARY VASCULAR SHUNTS IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Trewby, P. N.; Williams, R.; Williams, A.; Reid, L. (King's Coll. Hosp. and Medical Sch., London, England). *Digestion* 14(5/6):466; 1976.

2475 ANEMIC INFARCTION OF THE LIVER RESULTING FROM HEPATIC AND PORTAL VEIN THROMBOSIS. (Eng.) Ghandur-Mnaymneh, L. (Dept. Pathology, American Univ. Beirut, Beirut, Lebanon). *Johns Hopkins Med. J.* 139(Suppl.):78-81; 1976.

2476 DISEASES OF THE ALIMENTARY SYSTEM: JAUNDICE. (Eng.) Murray-Lyon, I. M.; Reynolds, K. (Charing Cross Hosp., London W6 8RF, England). *Br. Med. J.* 2(6041):923-925; 1976.

2477 PNEUMATOSIS INTESTINALIS ASSOCIATED WITH HEPATIC PORTAL VENOUS GAS. (Eng.) Dodds, W. J.; Stewart, E. T.; Goldberg, H. I. (Medical Coll. Wisconsin, 8700 West Wisconsin Ave., Milwaukee, WI 53226). *Am. J. Dig. Dis.* 21(11):992-995; 1976.

See also, 1786, 1870, 1967, 1968, 1974, 2103, 2105, 2111, 2149, 2150, 2151, 2152, 2153, 2154, 2172, 2173, 2199, 2202, 2208, 2213, 2316, 2501, 2539, 2545, 2559, 2580, 2599, 2607, 2648, 2662.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

2478 PHARMACOGENETIC ASPECTS OF GILBERT'S SYNDROME (GS) [Abstract]. (Eng.) Kupfer, A.; Platzer, R.; Preisig, R.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 14(5/6):468; 1976.

See also, 2457.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

2479 ULTRASTRUCTURAL CHANGES IN ASPIRIN HEPATOTOXICITY. (Eng.) Iancu, T.; Elian, E. (Sharon Hosp., Petah-Tikva, Israel). *Am. J. Clin. Pathol.* 66(3):570-575; 1976.

The ultrastructural findings in a percutaneous liver biopsy specimen from a 9-yr-old boy who had elevated serum transaminase levels while receiving aspirin treatment for rheumatic fever are presented. The patient had been treated with 3.6 g of aspirin per day for 10 days and 3.0 g daily after that. The SGOT level was 220 mIU/ml, and the SGPT was 240 mIU/ml at the time that the serum salicylate level was 21 mg/ml. Extensive fine-structure changes of the hepatocytes, similar to those induced by hepatotoxic drugs, were seen at this time. These included marked dilatation of rough endoplasmic reticulum, proliferation of smooth endoplasmic reticulum, and mitochondrial abnormalities. The aspirin treatment was discontinued, and 1 month after discharge from the hospital, the patient showed no clinical or laboratory evidence of rheumatic fever or hepatic disease. The morphologic changes in this patient are thought to be evidence that aspirin is hepatotoxic. This study confirms the need for monitoring patients receiving systemic aspirin treatment by repeated transaminase measurements.

2480 LIVER DISEASE IN VINEYARD SPRAYERS. (Eng.) Cortez Pimentel, J.; Peixoto Menezes, A. (Universidade de Lisboa, Instituto de Anatomia Patologica, Avenida Professor Egas Moniz, Lisbon, Portugal). *Gastroenterology* 72(2):275-283; 1977.

Liver disease with inclusions of copper was recognized among 30 workers with "vineyard sprayer's lung"; the pathological findings of these patients are described, and the results of previous studies in which guinea pigs were exposed daily to aerosols of copper oxychloride (50% Cu) or oxychloride (37.5% Cu) plus zineb (16%) are briefly presented. The pathological findings in the workers were varied: focal or diffuse swelling and proliferation of Kupffer cells; histiocytic and sarcoid-like granulomata; fibrosis of variable degree in the perisinusoidal, portal, and subcapsular areas, accompanied by atypical proliferation of the sinusoidal lining cells; micronodular cirrhosis; angiosarcoma of the liver; and idiopathic portal hypertension. Abundant copper deposits were revealed by histochemical techniques within hepatic and pulmonary lesions in these patients. The observations on the human and experimental material suggest that the lesions described are related to copper sulfate exposure. A morphological resemblance was noted between the "liver disease of vineyard sprayers" and the hepatic lesions reported in workers exposed to inorganic arsenic and to vinyl chloride.

2481 COLITIS AND HEPATITIS CAUSED BY METHYLDOPA. (Eng.) Bonkowsky, H. L.; Brisbane, J. (Veterans Admin. Hosp., White River Junction, VT 05001). *JAMA* 236(14):1602-1603; 1976.

The case of a 55-yr-old man in whom acute, reversible hepatitis and colitis developed after methyldopa therapy is presented. The patient had received antihypertensive therapy with hydrochlorothiazide (100 g/day) for 6 days, after which methyldopa (250 mg, t.i.d., p.o.) was added to the treatment regimen. Seven days later, the patient presented with fever, bloody diarrhea, and a symmetrically distributed erythematous macular rash on the back and flanks. Proctoscopy and mucosal biopsy specimens revealed mucosal inflammation. The liver was palpable, the SGOT level was 150 Karmen U/ml, and total bilirubin was 2.3 mg/100 ml. Nine days after discontinuing all medication, all symptoms had cleared, and the liver function tests returned to normal. The symptoms reappeared for 48 hr after the patient had taken 50 mg of hydrochlorothiazide and 250 mg of methyldopa. Hydrochlorothiazide therapy was resumed without adverse effects. It appears that methyldopa can produce acute colitis, as well as the previously recognized hepatitis, by an allergic reaction.

2482 ORAL METHIONINE IN THE TREATMENT OF SEVERE PARACETAMOL (ACETAMINOPHEN) OVERDOSE. (Eng.) Crome, P.; Volans, G. N.; Vale, J. A.; Widdop, B.; Goulding, R. (Guy's Hosp., London SE1 9RT, England). *Lancet* 2(7990):829-830; 1976.

The use of methionine as an alternative to cysteamine in the treatment of 30 patients at risk of hepatic damage from paracetamol overdose was evaluated. Methionine was given p.o. at 2.5 g/4 hr, up to a total of 10 g. The patients received the first dose within 10 hr of overdose. There were no deaths, and no reports of hepatic encephalopathy or other complications. In 3 patients, the maximum plasma aspartate aminotransferase exceeded 1,000 IU/1, in 6 it was 35-250 IU/1, and in the remaining 21 patients it remained normal. These results suggest that methionine may be effective in reducing the frequency and severity of paracetamol-induced liver damage and may provide an effective nontoxic alternative to cysteamine.

2483 INTRAHEPATIC CHOLESTASIS FOLLOWING THE USE OF ATROMID-S. (Eng.) Valdes, M.; Jacobs, W. H. (Menorah Medical Center, Kansas City, MO). *Am. J. Gastroenterol.* 66(1):69-71; 1976.

See also, 2501.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

484 HEPATITIS A. (Eng.) Maynard, J. E. (Bureau of Epidemiology, Center for Disease Control, U.S. Public Health Service, 4402 North eventh St., Phoenix, AZ 85014). *Yale J. Biol. Med.* 9(3):227-233; 1976.

Etiologic and epidemiologic aspects of hepatitis A are discussed. Hepatitis A is a disease of worldwide distribution, which occurs in endemic and epidemic form and is transmitted primarily by person-to-person contact through the fecal-oral route.

Fecal carriers of the virus who are asymptomatic or are in the preclinical stages of the disease are major contributors to the spread of infection. Common source epidemics due to water and milk have been observed, and food-borne outbreaks of hepatitis A are relatively common. Hepatitis A-associated viral-like particles have been visualized by immune electron microscopic techniques in early acute-illness-phase stools of humans with hepatitis A, as well as in chimpanzees experimentally infected with hepatitis A virus-containing material. The particles are spheres of approximately 27-nm diameter and are surrounded by halos, which represent specific hepatitis A antibody interacting with virus. Laboratory techniques for the diagnosis and seroepidemiologic investigation of hepatitis A include complement fixation and immune adherence tests. The morphologic and immunologic similarity of the various classes of particles referred to as hepatitis A antigen, together with the consistency in worldwide epidemiologic patterns for the disease, suggest that hepatitis A is caused by a single viral agent lacking the heterogeneity of hepatitis B virus structural components and that there may be a relative antigenic homogeneity between strains of virus recovered from various parts of the world. Serologic studies indicate that hepatitis A virus is not a major contributing cause in post-transfusion hepatitis.

2485 VIRAL HEPATITIS, TYPE A: ETIOLOGY AND EPIDEMIOLOGY.

(Eng.) Dienstag, J. L.; Purcell, R. H. (Massachusetts General Hosp., Boston, MA 02114). *Rush-Presbyt. St. Luke's Med. Bull.* 15(2):104-114; 1976.

The etiology and epidemiology of viral hepatitis A is reviewed. Studies in man and nonhuman primates during the previous 30 yr provided a groundwork for the current acceleration in the understanding of type A hepatitis. Recently, a 27-nm virus-like particle, designated hepatitis A antigen (HA Ag), was detected in stools of patients with acute type A viral hepatitis and, subsequently, in the sera and livers of infected marmosets. The discovery of HA Ag was instrumental in the development of several *in vitro* diagnostic tests to identify both antigen and antibody. With these new techniques, it has been possible to characterize and purify HA Ag particles to demonstrate the transmission of hepatitis A virus in chimpanzees, to test the susceptibility of other nonhuman primates, and to study the immunology and seroepidemiology of hepatitis A virus infection. Evidence accumulating from these studies suggests that HA Ag is the etiologic agent of type A viral hepatitis. In addition, seroepidemiologic investigations with these new diagnostic techniques have identified a new category of viral hepatitis unrelated to either hepatitis A or B viruses, so called "non-A, non'B" hepatitis.

2486 ANTIBODY TO HEPATITIS A ANTIGEN IN INSTITUTIONALIZED MENTALLY RETARDED PATIENTS.

(Eng.) Szmuness, W.; Purcell, R. H.; Dienstag, J. L.; Stevens, C. E. (New York Blood Center, 310 E. 67th St., New York, NY 10021). *JAMA* 237(16): 1702-1705; 1977.

The sera of patients with Down's syndrome and matched controls with other causes of mental retardation were tested by immune adherence hemagglutination for the presence of antibody to hepatitis A antigen (anti-HA). Among a total of 233 patients tested, 175 were anti-HA positive (75.1%). Patients with Down's syndrome had almost exactly the same rate of anti-HA positivity (73.7%) as those with mental retardation caused by other factors (76.5%). There were no sex or age differences. Patients reactive for hepatitis B surface antigen (HBsAg) or its antibody (anti-HBs) were reactive for anti-HA more frequently than those with a negative reaction for these markers (87% with HBsAg and 77% with anti-HBs versus 61%). The rate of anti-HA positivity was closely correlated with the duration of institutionalization: of 80 patients who had been institutionalized for less than 3 yr, 61.2% were anti-HA positive, whereas 82.4% of 153 patients institutionalized for 3 yr or longer were anti-HA positive. In contrast to serologic markers of hepatitis type B, the prevalence of anti-HA does not depend on the cause of mental retardation or on the age at primary infection. This study confirms that many closed institutions for the mentally retarded are hyperendemic for hepatitis type A and that formation of anti-HA is not greatly affected by either immune deficiency or immune immaturity.

2487 ACTION OF A NEW ANTIVIRAL DRUG ON THE HEPATITIS B ANTIGEN (HBAg) IN PATIENTS WITH VIRAL HEPATITIS AND ON HEALTHY CARRIERS.

(Por.) de Padua Vilela, M.; Siqueira, W. A.; Rodrigues, L. D.; Domingues, S. H. S.; dos Santos Rodrigues, F. (Escola Paulista de Medicina, Sao Paulo, Brazil). *Rev. Bras. Clin. Ter.* 3(7):251-254; 1975.

Results of clinical trials of the activity of ribavirin on the hepatitis B antigen (HBAg) in 5 patients with viral hepatitis and in 17 healthy subjects (carriers) with positive HBAg antigenemia are reported. The HBAg titers were determined by reverse immunoelectrophoresis during the week preceding and the week following the treatment. Among the patients with hepatitis, the treatment (100 mg t.i.d. x 12, p.o. in 2/5; 200 mg t.i.d. x 20, p.o., in 2/5; 100-200 mg t.i.d. or q.i.d. x 10-30, p.o., in 1/5, for a total dose of 40 g for 3 courses) resulted in negative HBAg immunologic response in 3/3 with chronic hepatitis and 1/2 with prolonged hepatitis, and decreased response in 1/2 with prolonged hepatitis. Among the carriers, the treatment (100 mg q.i.d. x 10 in 6; 200 mg t.i.d. x 20 in 11) resulted in negativity of the HBAg titer in three, decreased titer in six, and unchanged immunologic response in eight. The tolerance was good and no side-effects were noted. In spite of the encouraging results obtained, the authors stress the necessity of further investigations to determine the transitory or permanent character of the results. The possibility of clinical trials with higher doses is considered.

488 VIRAL HEPATITIS, TYPE B. (Eng.) Barker, L. F. (Bureau Biologics, Food and Drug dmin., Bethesda, MD 20014). *Yale J. Biol. Med.*)(3):235-241; 1976.

epatitis B virus (HBV) is discussed in terms of s clinical features, epidemiology, detection, d cure or prevention. The presumptive infectious rm of HBV is a 40-42-nm Dane particle, which consists of an inner nucleocapsid core antigen (HBcAg) d an outer lipoprotein surface antigen (HBsAg). e interval between exposure and appearance of etectable serum HBsAg is related to the infectivity iter of the inoculum and probably to the exposure ute. HBsAg appears in the serum days or weeks efore clinical signs and symptoms appear. Antibody ctivity against HBcAg (anti-HBc) appears during e acute illness, while HBsAg is still present. e HBV carrier state, manifested by the persistence HBsAg and anti-HBc and the absence of detectable tibody against HBsAg (anti-HBs), develops in an stimated 5-10% of the infected adults in the United tates. The commonest modes of HBV spread are robably from infected mothers to infants and from e family member to another by close personal ntact. The most sensitive methods for detecting V antigens and antibodies are radioimmunoassays. most as sensitive are the following hemagglutination techniques: passive hemagglutination for anti-s detection, reversed passive hemagglutination r HBsAg detection, and immune adherence hemaglutination for anti-HBc detection. High titer epatitis B immunoglobulin appears to be capable giving partial and temporary protection against V infection, and experimental vaccines consisting formalin-treated HBsAg purified from human plasma ve provided protection against challenge with HBV susceptible chimpanzees.

89 HEPATITIS AMONG PLASMA FRACTIONATION WORKERS. AN INDUSTRY-WIDE STUDY. (Eng.) hen, S. R.; Butler, G. J.; Shmunes, E.; Holmes, W. (Natl. Inst. Occupational Safety and Health, bert Taft Lab., 4676 Columbia Parkway, Cincinnati, 45226). *J. Occup. Med.* 18(10):685-689; 1976.

survey of 14 plasma fractionation facilities in e United States was conducted during 1973-74 to sess the extent of hepatitis infection among rkers. Among 12 facilities responding to the rvey, 10 were engaged in the production of immune rum globulin (γ-globulin). The majority of fraconators were also involved in the manufacture of bumin (67%), tetanus immune globulin (67%), and tihemophilic factor (50%). In 1973, every fraconation facility in operation for longer than 1 had experienced clinical cases of viral hepatitis. total of 61 employees working in full-time posions with blood derivatives contacted hepatitis. ve facilities (36%) reported 25 cases of clinical patitis among employees with fringe-contact posure to blood products (i.e., less than 8 hr/ y of exposure). There were 43 (71%) full-time actionators who were employed as plasma poolers. the workers in full-time and fringe groups, 48% d 32%, resp., had participated in an immune serum obulin prophylaxis program prior to the onset of their clinical disease. The above data suggest that there is a high risk of hepatitis among plasma fractionation workers.

2490 HEPATITIS B (SURFACE) ANTIGEN AND VIRAL HEPATITIS IN FAMILY CONTACTS OF ACUTE HEPATITIS B PATIENTS. (Eng.) Farnik, J.; Beranova, I.; Vilim, V.; Dbala, D.; Vesely, V.; Jindra, J.; Zakova, M. (Inst. Microbiology and Epidemiology, Charles Univ., Marxova 13, 30599 Plzen, Czechoslovakia). *Zentralbl. Bakteriol.* [*Orig. A*] 236(2/3): 199-204; 1976.

Four hundred sixty-five family contacts of acute hepatitis B patients were followed up, and 344 were tested for the presence of hepatitis B surface antigen (HBsAg) at the time of the hospitalization of the index case and again after 3 months. The families were followed for a total of 6 months. Nineteen of 418 persons screened for the first time were HBsAg-positive, and 2 of these were hospitalized with acute inflammatory liver disease. The highest percentage of HBsAg-positive persons was found in the families of patients without a history of parenteral exposure. Five family contacts were hospitalized 2-4 months following the admission of the index patient. All were spouses of the index patients, and none had a history of parenteral exposure other than blood sampling for this study. Two cases of previously undetected antigenemia were found among the 344 contacts screened in the 3-month period.

2491 MOTHER-TO-INFANT TRANSMISSION OF HEPATITIS B VIRUS AND ITS CONSEQUENCES. REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Fre.) Bugnon, B.; Brette, R. (Hopital Edouard-Herriot, Pavillon H, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 64(8):667-670; 1975.

A case of mother-child hepatitis B virus transmission and its effect on the child are discussed. A 23-yr-old woman was infected with viral hepatitis at the onset of pregnancy. Diagnosis was based on increased (up to 1,100 U) glutamino-pyruvic transaminase levels and the presence of HBsAg in the serum, as assessed by immunodiffusion and electroimmunodiffusion; the hepatitis developed into chronic persistent hepatitis. The infant's examination for HBsAg in the blood of the umbilical cord was positive by radioimmunologic dosage and reverse hemagglutination. Moderately higher transaminase levels and slight hepatomegaly from the age of 1.5 months suggested subclinical infection. The child's infection could have occurred by mouth or parenterally at the time of delivery or prenatally through the amniotic fluid, or on the interior surface of the placenta; the presence of Dane's particles in the blood of the umbilical cord proved the possibility of transplacental transmission. The baby's infection and resulting liver damage was sometimes clinically obvious and sometimes at a subclinical level. The virus can persist up to 39 months in affected infants. Many of them, with no biological liver disorder, should be considered as healthy carriers. Histological changes in the infant consisted of ballooning liver cells (cobblestone pattern), necrotic foci, and portal lymphoid hyperplasia. In view of the absence of effective treatment of these cases of hepatitis, efforts should essentially concentrate on the prevention of neonatal infection, with specific anti-HBsAg γ-globulin therapy at birth.

2492 VIRAL HEPATITIS TYPE B DURING PREGNANCY, THE NEONATAL PERIOD, AND INFANCY. (Eng.)

Gerety, R. J.; Schweitzer, I. L. (DBBP, Bureau Biologics, FDA, 8800 Rockville Pike, Bethesda, MD 20014). *J. Pediatr.* 90(3):368-374; 1977.

The diagnostic and prognostic significance of three hepatitis B-associated antigens and antibodies in the development of the chronic carrier state in infants was assessed. Eighteen women who developed type B hepatitis late in pregnancy or early in the postpartum period (groups I and II), 12 women who were chronically infected with the hepatitis B virus (groups III and IV), and 32 of their offspring were tested for hepatitis B surface antigen (HBsAg), antibody to HBsAg, antibody to the hepatitis B core antigen, and for the hepatitis B-associated e antigen and its antibody. Twelve of 18 infants born to group I and group II mothers and 5 of 14 infants born to group III and group IV mothers became chronically infected with hepatitis B virus (HBV); the outcome did not appear to be influenced by maternal anti-HBc titers, by antigen subtype, by the presence or absence of HBsAg in the cord sera, or by the infants' birth weights or gestational ages. The presence of maternal e antigen did correlate with the development of chronic HBV infections in the infants studied. The e antigen appeared in five infants born of e antigen-negative mothers, but did not appear to be associated with the morbid prognosis that generally accompanies its presence in adult HBsAg carriers. The data also suggest that maternal anti-e may favor HBsAg clearance and recovery in neonatally acquired HBV infections.

2493 PREGNANCY HEPATITIS IN LIBYA. (Eng.)

Christie, A. B.; Allam, A. A.; Aref, M. K.; El Muntasser, I. H.; El-Nageh, M. (2 Beach Lawn, Liverpool L22 8QA, England). *Lancet* 2(7990):827-829; 1976.

The incidence and death rate of hepatitis in pregnant women in Libya were studied. Of 922 hepatitis patients treated during 1975, 377 were men and 545 were women. The fatality rates were 0.53% and 7.67%, resp. The death rate in pregnant women (12.97%) was much higher than that in nonpregnant women (1.6%). Among the 36 fatal cases in which the month of pregnancy was noted, 25 deaths occurred in the last trimester, and 30 of the 34 deaths occurred during the last 4 months of pregnancy. Although 18.4% of the male patients and 15.2% of the women were hepatitis B surface antigen-positive, no patient shown to be antigen-positive died. The frequency of hepatitis in the second half of the year fell both in pregnant women and in the general population, suggesting a waning hepatitis B epidemic. Because all the men claimed to eat a full balanced diet with ample animal protein and the women said their diet was mostly carbohydrate, the high mortality rate among the pregnant women may have had a nutritional basis.

2494 MULTIPLE HEPATITIS VIRUSES IN MULTIPLE ATTACKS OF ACUTE VIRAL HEPATITIS. (Eng.)

Mosley, J. W.; Redeker, A. G.; Feinstone, S. M.; Purcell, R. H. (John Wesley County Hosp., 2826 S. Hope St., Los Angeles, CA 90007). *N. Engl. J. Med.* 296(2):75-78; 1977.

The causes of 30 episodes of acute viral hepatitis were investigated in 13 patients who had multiple attacks. Two of 30 bouts were caused by hepatitis A virus, and 12 by hepatitis B virus. No patient, however, had more than one attack with the serologic characteristics of type A or type B disease. Thus, there were 16 bouts (53%) not attributable to either of the two recognized hepatitis viruses. None of these "non-A, non-B" episodes, evaluated for infectious mononucleosis and cytomegalovirus infection, could be ascribed to either. It appears that the clinical syndrome of viral hepatitis is produced not only by hepatitis A and B viruses, but also by two other agents.

2495 HEPATITIS B ANTIGEN: A REVIEW OF ITS IMPORTANCE IN THE PRACTICE OF OBSTETRICS AND GYNECOLOGY. (Eng.)

Babb, R. R. (Palo Alto Medical Clinic, 300 Homer Ave., Palo Alto, CA 94301). *Am. J. Obstet. Gynecol.* 126(5):602-606; 1976.

The importance of the hepatitis B antigen (HBAg) serologic test in obstetrics and gynecology is reviewed. HBAg has been demonstrated in patients with acute and chronic hepatitis and also in clinically healthy persons; the incidence of the antigen in blood donors ranges from 0.1 to 0.5%. Viral hepatitis is an occupational hazard for medical personnel, and those with a positive test are potentially infectious. Infants born to mothers who are either HBAg carriers or ill with hepatitis B may become HBAg positive and develop chronic hepatitis. The risk of a neonate becoming HBAg positive depends on the stage of intrauterine development when exposure to the virus occurred. Acute hepatitis B infection near term is associated with the highest risk. Of 158 babies born to healthy hepatitis B surface antigen (HBsAg) carriers, 63 became antigen positive within a few months of birth. Three factors appear to increase the chance of developing antigenemia in these babies: the HBsAg titer in the mother's blood, the presence of HBsAg in cord blood, and a positive HBsAg test in siblings' blood. The route of infection is related to both transplacental transmission of the virus and ingestion of contaminated material at the time of delivery. Once HBAg positive, the infants generally remain so.

2496 OCCURRENCE OF SUBTYPES OF HEPATITIS B ANTIGEN IN ACUTE HEPATITIS AND CHRONIC LIVER DISEASES. (Hun.)

Buki, B.; Szalay, F.; Nagylucskay, S.; Schvaab, E. (I. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 116(27):1567-1569; 1975.

occurrence of *ad* and *ay* subtypes of hepatitis
ntigen was studied by immunoelectro-osmophoresis
the sera of 510 patients with HBsAg-positive acute
atitis, of 853 patients infected with B virus hep-
tis in epidemic foci, and of 113 patients with
onic liver diseases. Subtype *ad* was detected in
of the 510 patients with acute viral hepatitis;
ay subtype was found in 281. Subtype *ad* was found
138/353 icteric patients, and subtype *ay* in 215/353;
incidences of *ad* and *ay* were 91/157 and 66/157
anicteric patients, resp. Subtype *ad* was found
126/268 men, and *ay* in 142/268. In women, *ad* was
nd in 103/242, and *ay* in 139/242. The incidence of
two subtypes was nearly equal under the age of
yr, while *ay* was slightly more frequent in pa-
nts aged over 21 yr. Two hundred sixty-one
ients were re-examined during the convalescence;
of them had the *ad* subtype, and 174 had the *ay* sub-
e during the acute period; 20 patients remained
Ag-positive, with 6 having *ad*, and 14, *ay*. Five
dred twenty-nine patients were infected by sources
ing the *ay* subtype; all patients were found to
e the *ay* subtype, while 1 of the 324 patients
ected by an *ad* source had the *ay* subtype. Thirty-
of the 113 patients with chronic liver disease
e HBsAg-positive, 7 had subtype *ad*, and 24 had *ay*.
patient with subtype *ad* and 6 with *ay* were
nd among 35 patients with chronic persisting
atitis. Fourteen of the 26 patients with crypto-
ic cirrhosis were positive; 4 had subtype *ad*, and
subtype *ay*. One patient with *ad* and another with
were found among 13 patients with alcoholic fatty
eneration. One patient with *ad* and 2 with *ay*
e found among 20 patients with alcoholic cirrhosis.
ee patients had subtype *ay* among 19 patients
h other liver diseases (secondary biliary cirrho-
, chronic cholangiohepatitis, cholestasis of
gnancy, unidentified toxic hepatic lesions).

7 AN EPIDEMIC OF INFANTILE PAPULAR ACRODERMATITIS (GIANOTTI'S DISEASE) IN JAPAN OCIATED WITH HEPATITIS-B SURFACE ANTIGEN SUBTYPE

. (Eng.) Ishimaru, Y.; Ishimaru, H.; Toda, G.;
a, K.; Mayumi, M. (Ishimaru Pediatric Clinic,
suyama City 790, Japan). *Lancet* 1(7962):707-
; 1976.

epidemic of infantile papular acrodermatitis
A) in Japan is reported. Between October, 1974
September, 1975, the disease was diagnosed in
children on the basis of the following symptoms:
-itching, erythematous papular dermatitis on the
e and extremities; inguinal and axillar lymph
e enlargement; hepatomegaly; and abnormal liver
ction tests. Eighty-eight percent of the patients
e less than 3 yr old. In the 54 patients tested,
were hepatitis B surface antigen (HBsAg)-positive
determined by an immune adherence hemagglutina-
n method), whereas only 3 of 43 mothers, 1 of 37
hers, and 7 of 27 siblings of these patients were
igen-positive. HBsAg was found in the serum of
majority of patients when tested on the first
of skin eruption (25 of 27 cases). Antibody to
Ag (anti-HBs) was not detected in any of the pa-
nts with IPA. The exposure rate (the percentage
individuals with either HBsAg or anti-HBs) was
9% in patients, 40.7% in siblings, 19.1% in mothers, and 10.9% in fathers; anti-HBs occurred in 14.8%, 11.6%, and 8.1% of the siblings, mothers, and fathers, resp. HBsAg subtype *ayw* was identified by a hemagglutination-inhibition method in 42 of 48 patients, whereas this subtype was detected in only 3 of 7 siblings, in none of 4 mothers and fathers, and in none of 168 symptom-free blood donors with HBs antigenemia. Subtype *adr* was found in 3 of the 48 patients, and *adw* was not found. Because subtype *ayw* and IPA are extremely rare in Japan, the association of the disease with HBsAg subtype *ayw* is considered to be extremely significant. The immature immunological status of these patients may have influenced the development of the clinical manifestations.

2498 POST-TRANSFUSION HEPATITIS: THE ROLE OF HEPATITIS B ANTIBODY.

(Eng.) Koretz, R. L.; Overby, L. R.; Gitnick, G. L. (Center Health Sciences, Univ. California, Los Angeles, CA 90024). *Gastroenterology* 70(4):556-561; 1976.

The question of whether transfusion of hepatitis B surface antibody (anti-HBs) positive blood would contain undetectable amounts of hepatitis B surface antigen (HBsAg), thereby increasing the risk of hepatitis B, or whether it would provide a protective effect against post-transfusion hepatitis (PTH) was studied. Various groups of patients were screened and found to have received transfusions of either HBsAg positive or anti-HBs positive blood, both of these (given at different times), or transfusions of blood that were negative for each. Commercial blood was much more likely to contain anti-HBs than was volunteer blood. Patients who received higher titers of antibody tended to receive more units of blood, with more of this blood coming from commercial sources, making interpretation of the data difficult. Infusion of anti-HBs was not protective against PTH or hepatitis B events. Indeed, infusion of high titers of anti-HBs was associated with an increased incidence of hepatitis B. These data are consistent with the theory that some anti-HBs positive units of blood contain small amounts of infective HB virus.

2499 HERPESVIRUS HOMINIS HEPATITIS AND DISSEMINATED INTRAVASCULAR COAGULATION: OCCURRENCE IN AN ADULT WITH PEMPHIGUS VULGARIS.

(Eng.) Keane, J. T.; Malkinson, F. D.; Bryant, J.; Levin, S. (Rush-Presbyterian-St. Luke's Medical Center, 1753 W. Congress Parkway, Chicago, IL 60612). *Arch. Intern. Med.* 136(11):1312-1317; 1976.

A case of herpesvirus hominis (HVH) hepatitis in a 36-yr-old woman who had received prednisone therapy for pemphigus vulgaris continuously for 7 yr is reported. The patient presented with multiple oral and genital erosions, abdominal pain, and lethargy; hematemesis and guaic-positive stools developed. Moderate right upper quadrant tenderness without hepatomegaly was noted, and bowel sounds were hypoactive. After an acute terminal illness that was characterized by fulminant hepatic failure and disseminated intravascular coagulation, postmortem examination revealed massive hepatic necrosis.

herpesvirus (type 1) was isolated from the liver. The ten previously reported cases of HVH hepatitis in adults are reviewed. Greater awareness of the clinical manifestations of HVH hepatitis should lead to early diagnosis, although successful modes of therapy await development.

2500 LIVER TESTS, HB-Ag AND HB-Ab IN ASYMPTOMATIC DRUG ADDICTS. (Eng.) Mangla, J. C. Kim, Y. M.; Brown, M. R.; Schwob, D.; Hanson, S. E. (Monroe Community Hosp., 435 E. Henrietta Rd., Rochester, NY 14603). *Am. J. Gastroenterol.* 65(2):121-126; 1976.

2501 WORK GROUP IV: INFLAMMATORY DISEASES OF THE LIVER. (Eng.) Alpert, E.; Isselbacher, K. J.; Klatskin, G.; Koff, R. S.; McCollum, R. W., Jr.; *et al.* (No affiliation given). *Gastroenterology* 69(5):1095-1107; 1975.

2502 ACUTE VIRAL HEPATITIS B. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 3(5983):603; 1975.

2503 ACUTE VIRAL HEPATITIS. (Eng.) Lee, W. M. (Presbyterian Hosp., New York, NY). *Med. Times* 104(2):113-115; 1976.

2504 ACUTE HEPATITIS: A PROGNOSTIC STUDY WITH OBSERVATION TIME UP TO 37 YEARS [Abstract]. (Eng.) Dietrichson, O.; Zoffmann, H.; Christoffersen, P.; Juhl, E.; Hilden, M.; Thomsen, A. C. (Kommunehospitalet, Copenhagen, Denmark). *Digestion* 14(5/6):505; 1976.

2505 IMMUNOLOGY AND EPIDEMIOLOGY OF THE HEPATITIS B (AUSTRALIA) ANTIGEN [Abstract]. (Eng.) Nelson, M. (Univ. New South Wales, Australia). *Diss. Abstr. Int.* [*B*] 36(10):4955-B; 1976.

2506 CHANGE OF HBsAg SUBTYPE IN ACUTE HEPATITIS IN A FIVE-YEAR-PERIOD [Abstract]. (Eng.) Guardia, J.; Pedeira, J. D.; Martinez-Vazquez, J. M.; Bacardi, R. (Dept. Internal Medicine, Univ. Autonoma, Barcelona, Spain). *Digestion* 12(4/6):310; 1975.

2507 HEPATITIS ATTRIBUTED TO POLLUTED STREAM. (Eng.) Chapman, L. (Tacoma-Pierce County Health Dept., Tacoma, WA). *J. Environ. Health* 38(4):238-241; 1976.

2508 LESSER BUSHBABIES (Galago senegalensis) MAY BE SUSCEPTIBLE TO THE CR 326 HEPATITIS A VIRUS. (Eng.) Grabow, W. O. K.; Prozesky, O. W. (Natl. Inst. Water Res., CSIR, P.O. Box 395, Pretoria, 0001, South Africa). *S. Afr. J. Sci.* 71(10):310-311; 1975.

2509 A FOLLOW-UP STUDY OF 32 HEPATITIS B ANTIGEN (HBsAg) HEALTHY CARRIERS [Abstract]. (Eng.) Piccinino, F.; Manzillo, G.; Sagnelli, E.; Maio, G.; Pasquale, G.; Giusti, G. (First Medical Sch., Univ. Naples, Naples, Italy). *Digestion* 14(5/6):540; 1976.

2510 HEPATITIS. (Eng.) Popper, H. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Med. Times* 104(2):96, 99-103, 106-107; 1976.

2511 SCHOOL CHILDREN AND REPORTED HEPATITIS: AN EPIDEMIOLOGIC NOTE. (Eng.) Taylor, W. C. (Boston City Hosp., 818 Harrison Ave., Boston, MA 02118). *Am. J. Public Health* 66(8):793-794; 1976.

2512 PREDICTING PROGRESSION OF ACUTE TYPE-B HEPATITIS TO CHRONICITY. (Eng.) Sherlock, S. (Royal Free Hosp., London, England). *Lancet* 2(7981):354-356; 1976.

2513 HBsAg CONVERSION AND PERSISTENCE IN HAEMODIALYSIS (HD) PATIENTS WITH ACUTE VIRAL HEPATITIS (AVH) B: BIOCHEMICAL AND SEROLOGICAL DIFFERENCE [Abstract]. (Eng.) Niermeijer, P.; Gips, C. H.; Tegzess, A. (Univ. Hosp., Groningen, Netherlands). *Digestion* 14(5/6):536; 1976.

2514 NON-A, NON-B POSTTRANSFUSION HEPATITIS: PROGRESSION TO CHRONIC LIVER DISEASE AND ROLE OF GAMMA GLOBULIN PROPHYLAXIS [Abstract]. (Eng.) Knodell, R.; Conrad, M.; Ishak, K. (Univ. New Mexico, Albuquerque, NM). *Clin. Res.* 25(2):110A; 1977.

2515 RATIONAL USE OF HEPATITIS B IMMUNE GLOBULIN [Abstract]. (Eng.) Iwarson, S.; Hermodsso S. (East Hosp., Goteborg, Sweden). *Digestion* 14(5/6): 106; 1976.

2516 ADMINISTRATION OF HUMAN FIBROBLAST INTERFERON IN CHRONIC HEPATITIS-B INFECTION. (Eng.) Desmyter, J.; De Groote, J.; Desmet, V. J.; Billiau, A.; Ray, M. B.; Bradburne, A. F.; Edy, V. G.; *et al.* (Rega Inst. Medical Res., Minderbroedersstraat 10, B-3000 Leuven, Belgium). *Lancet* 2(7987):645-647; 1976.

2517 THE PROGNOSTIC SIGNIFICANCE OF THE IN VITRO COMPLEMENT FIXATION IN BIOPSIES OF PATIENTS WITH ACUTE VIRAL HEPATITIS TYPE B [Abstract]. (Eng.) Rizzetto, M.; Bonino, F.; Diana, S.; Verme, G. (Ospedale Mauriziano Umberto I, Torino, Italy). *Digestio* 14(5/6):486; 1976.

2518 PROGNOSTIC SIGNIFICANCE OF IgM/IgG SMOOTH MUSCLE ANTIBODY (SMA) IN HARD-DRUG ADDICTS (DA) AND OTHER PATIENTS WITH ACUTE VIRAL HEPATITIS (AVH) [Abstract]. (Eng.) Niermeijer, P.; Gips, C. H.; Verkerk, S.; Snijder, J. A. M. (Univ. Hosp., Groningen, Netherlands). *Digestion* 14(5/6):537; 1976.

2519 SMOOTH MUSCLE ANTIBODY (SMA) IMMUNOGLOBULIN CLASSES AND SMA LOCALISATION IN ACUTE VIRAL HEPATITIS (AVH) B. SMA AND THYMOL TURBIDITY TEST (TTT) [Abstract]. (Eng.) Niermeijer, P.; Gips, C. H.; Verkerk, S.; Snijder, J. A. M. (Univ. Hosp., Groningen, Netherlands). *Digestion* 14(5/6):537-538; 1976.

2520 T-LYMPHOCYTE-MEDIATED CYTOTOXICITY IN HBsAG-POSITIVE ACUTE AND CHRONIC LIVER DISEASE: DEVELOPMENT OF A NEW ASSAY [Abstract]. (Eng.) Sheikh, N. E. L.; Osman, C. G.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):549; 1976.

2521 EFFICACY OF AN INDIGENOUS COMPOUND PREPARATION (Liv-52) IN ACUTE VIRAL HEPATITIS--A DOUBLE BLIND STUDY. (Eng.) Sama, S. K.; Krishnamurthy, L.; Ramachandran, K.; Lal, K. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Indian J. Med. Res.* 64(5):738-742; 1976.

2522 EFFECTS OF FRUCTOSE INFUSIONS IN PATIENTS SUFFERING FROM ACUTE VIRAL HEPATITIS. (Eng.) Galanti, B.; Nardiello, S.; Russo, M.; Giusti, G. (1ª Facolta di Medicina, Universita di Napoli, Via Domenico Cotugno 1, I-80135, Naples, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):26-31; 1976.

See also, 2104, 2210, 2211, 2448, 2467, 2525, 2603, 2668.

LIVER AND BILIARY TRACT

Chronic Hepatitis

2523 CHRONIC ACTIVE HEPATITIS IN HEPATITIS B SURFACE ANTIGEN (HBsAg) CARRIERS: THE NEED FOR LIVER BIOPSY. (Eng.) Sampliner, R. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *JAMA* 237(1):50-51; 1977.

The cases of patients with chronic active hepatitis discovered during routine screening for hepatitis B surface antigen (HBsAg) for blood donation are presented. Only one patient had sought medical attention prior to the discovery of hepatitis B antigenemia, and her problem had not been recognized at that time. The liver biopsy findings included piecemeal necrosis (1 patient), bridging necrosis (1 patient), and chronic active hepatitis and cirrhosis (2 patients). SGOT ranged from 87 to 810 U/ml and SGP from 154 to 573 U/ml in these four patients; the maximum globulin levels in three of the patients were 3.5, 0.84, and 1.72 g/100 ml. One patient was asymptomatic, one had only a 1-month history of easy fatigability initiated by 1 week of intermittent vomiting, and the third patient had a 1-yr history of easy fatigability. The fourth patient had been exposed to hepatitis 2 months prior to the detection of HBsAg and was asymptomatic at this time. He was also e-antigen-positive. Both antigens persisted for 19 months, and he subsequently developed clinical icteric hepatitis. Because clinically occult liver disease can be histologically severe, liver biopsy is indicated when liver enzyme levels are persistently abnormal in long-term HBsAg carriers.

2524 CLINICAL AND IMMUNOLOGICAL OBSERVATIONS IN HEPATITIS B ANTIGEN-POSITIVE AND HEPATITIS B ANTIGEN-NEGATIVE CHRONIC ACTIVE HEPATITIDES. (Hun.) Par, A.; Bajtai, G.; Barna, K.; Gogl, A.; Patakfalvi, A.; Balazs, M.; Miszlai, Zs. (I. Belgyogyaszati Klinika, Pecsi Orvostudomanyi Egyetem, Pecs, Hungary). *Orv. Hetil.* 116(30):1743-1747; 1975.

Clinical, biochemical, and immunological findings in 24 patients with hepatitis B antigen (HBAg)-positive and in 24 patients with HBAg-negative chronic persistent hepatitis are presented. Long-term remission was achieved by prednisolone or prednisolone plus azathioprine in 18 patients in the HBAg-positive group, and in 15 of the HBAg-negative patients, the disease progressed in 2 and 3 patients, resp. Four HBAg-positive and six HBAg-negative patients died. Anamnestic data suggestive of viral hepatitis were found in two-thirds of the HBAg-positive patients, and the disease had an acute onset in about the same number of patients; the primary chronic form was more frequent among the HBAg-negative patients. The incidence of liver cirrhosis at diagnosis was higher in the HBAg-negative group. Hematological findings such as erythrocyte sedimetation reactions >20 mm/hr, RBC $<3.5 \times 10^6$, and WBC <4,000 were more frequent in the HBAg-negative group. The incidence of considerably increased serum alkaline phosphatase was also higher in this group. The IgG level was 146% of the normal value in the HBAg-positive group, versus 180% in the negative group ($p<0.1$). The IgM level averaged 143% of the normal level in the positive group, versus 121% in the negative group; however, the IgM level was below normal in many patients in both groups. The humoral and cellular autoimmune reactions showed no marked differences between the two groups. The findings indicate the role of immunological factors in the pathogenesis of both forms of chronic persisting hepatitis, in spite of the clinical, biochemical, and etiological differences.

2525 POST-TRANSFUSION CHRONIC LIVER DISEASE. (Eng.) Koretz, R. L.; Suffin, S. C.; Gitnick, G. L. (Center for the Health Sciences, Univ. California, Los Angeles, CA 90024). *Gastroenterology* 71(5):797-803; 1976.

Forty-seven patients with post-transfusion hepatitis were followed prospectively from transfusion to document the sequelae of acute hepatitis among recipients of commercial and volunteer blood and to assess factors influencing the development of chronic hepatitis (CH). Twenty-nine patients had SGPT levels elevated at least twofold for more than 20 weeks; they were classified as CH. When the patients with CH were compared with those with only acute hepatitis (abnormal SGPT for less than 20 weeks), no difference was found with respect to age, sex, number of units transfused, incubation period, presence or absence of symptoms, occurrence of jaundice, maximum SGPT, receipt or development of hepatitis B surface antigen or antibody, underlying illness, or area of the hospital where the patient was treated. Liver biopsies in 15 of the 29 revealed chronic active hepatitis in 9, chronic persistent hepatitis in 2, and unresolved hepatitis in 4. Five of the nine patients with chronic active hepatitis had no symptoms. None of these died or have developed cirrhosis. Because chronic liver disease frequently developed after acute post-transfusion hepatitis among multiply transfused hepatitis B surface antigen-negative blood recipients, close follow-up, including liver biopsy, is warranted in such patients with prolonged transaminase elevations.

2526 FOLLOW-UP OF LIVER HISTOLOGY IN CLINICALLY HEALTHY HBsAg CARRIERS OVER A PERIOD OF 4-5 YEARS [Abstract]. (Eng.) Kaboth, U.; Klinge, O.; Schober, A.; Winckler, K. (Medizinische Universitatsklinik, Gottingen, W. Germany). *Digestion* 14(5/6):525; 1976.

2527 IMMUNE COMPLEXES IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Hutteroth, T.; Meyer zum Buschenfelde, K. H. (Second Dept. Internal Medicine, Johannes Gutenberg Univ. Mainz, Mainz, W. Germany). *Digestion* 14(5/6):521; 1976.

2528 PERIPHERAL BLOOD 'K' CELLS AND ANTIBODY-DEPENDENT LYMPHOCYTE CYTOTOXICITY IN CHRONIC ACTIVE HEPATITIS AND PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) MacSween, R. N. M.; Sandilands, G. P.; Thomas, M. A.; Holden, R.; Watkinson, G. (Western Infirmary, Glasgow, Scotland). *Digestion* 14(5/6):532; 1976.

2529 INCREASED LYMPHOCYTE ADENOSINE DEAMINASE AND ADENOSINE TRIPHOSPHATE ACTIVITIES IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS (CAH) [Abstract]. (Eng.) Budillon, G.; Scala, G.; Mazzacca, G.; de Ritis, F. (Clinica Medica, Naples, Italy). *Digestion* 14(5/6):501; 1976.

See also, 2469, 2487, 2501, 2514, 2520, 2539, 2556.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

2530 INFLUENCE OF IRON FROM WINE ON THE DEPOSITS OF THIS METAL IN CHRONIC ALCOHOLICS. (Spa.) Miralles Garcia, J. M.; de Castro del Pozo, S. (Catedra de Patologia General, Salamanca, Spain). *Med. Clin. (Barcelona)* 64(6):284-289; 1975.

The relation of ingested iron from wines or distilled beverages to tissue iron storage was investigated in 48 chronic alcoholics; 47 subjects were wine drinkers. Twenty-four cases showed hepatic lesions, and four showed hepatitis. Clinical studies in alcoholics included: detailed anamnesis, beverage iron determination, histochemical determination of hepatic siderosis, hepatic iron determination (494.96 ± 143.75 mg/100 g), desferrioxamine-B test (1.33 ± 1 mg), and diethylenetriamine pentaacetic acid test (0.44 ± 55 mg). Although the only three cases of hemochromatosis with siderosis 4 had no history of alcoholism, they showed the highest liver and urine iron levels. For 17 controls, hematology showed iron, desferrioxamine-B and the pentaacetic acid to be 115 ± 56.38 mg/100 g, 1.10 ± 0.58 mg and 0.21 ± 0.08 mg, resp., with no cases of siderosis exceeding grade 1. The relation between hepatic iron concentrations in alcoholics and controls was significant ($p<0.1$).

2531 GASTRIC CLEARANCE OF SERUM ALBUMIN IN PATIENTS WITH ALCOHOLIC LIVER CIRRHOSIS. (Eng.) Andre, C.; Descos, F.; Descos, L.; Lambert.

R.; Bory, R. (U-45, INSERM, Hopital Edouard-Herriot, Pavillon H, F-69374 Lyon Cedex 2, France). *Digestion* 14(4):357-359; 1976.

To examine the possibility that plasma leakage through an abnormal digestive mucosa might contribute to hypoalbuminemia in liver cirrhosis, gastric albumin clearance studies were carried out in 26 patients with alcoholic liver cirrhosis and in 10 controls. An esophagogastroscopy with gastic fundal and antral biopsies was performed in each patient, and gastritis was estimated histologically. The serum albumin concentration was measured by the single-radial immunodiffusion method in the gastric secretion, buffered with glycine; the buffer contained phenol red as a dilution indicator. The mean gastric clearance of serum albumin in controls was .03 ml plasma/30 min; the clearance in the cirrhotic patients was more than twice as high, 2.08 ml/0 min (p<0.01). Increased gastric protein loss occurred only in the 15 patients with gastritis. The presence of distended esophageal varices (15 patients) did not influence protein loss. The results support the suggestion that plasma leakage through an abnormal digestive mucosa contributes to hypoproteinemia in liver cirrhosis.

532 ACUTE ALCOHOLIC HEPATITIS. (Hun.) Herics, M.; Keresztury, S.; Nagy, Gy.; ollath, Z. (Miskolci Semmelweis Korhaz I. Ferto-oosztaly, Miskolc, Hungary). *Orv. Hetil.* 116(45): 657-2660; 1975.

iochemical, clinical, and diagnostic aspects of 3 cases of acute alcoholic hepatitis are discussed. ll patients were chronic alcoholics; most of them ad increased their daily intake of alcohol during he last days or weeks before the onset of the isease. Loss of appetite, nausea, abdominal pains, aundice, and considerable enlargement and tenderess of the liver were seen in all cases. The biliubin level was increased by 3.1-24.5 mg%, due to ncreased direct bilirubin level. A moderate inrease was seen in the transaminase level in 31 ases. An increased serum alkaline phosphatase evel was found in 26 patients. The serum protein evel was below 5.6 g% in 44 cases. The serum gnesium level was decreased in 11/13 cases invesigated. The WBC count was increased in 50 cases. e thrombocyte count was below normal in 16 cases, d the prothrombin level was below normal in 31 cases. Three-fourths of the patients had temperatures of up to 39 C during the first 2-6 weeks. The length of the hospitalization ranged from 28 to 136 days. Five patients, including two women, died; the cause of death was acute hepatic insufficiency in four cases and hepatorenal syndrome in one. Therapy consisted of abstinence, protein-rich diet, vitamins, magnesium, folic acid, plasma transfusion, diuretics, and steroids. Two patients developed cirrhosis after 4 months of treatment. The histological examination of the biopsy specimens revealed proliferation of fibroblasts and connective tissue cells, round-cell infiltration, usually severe fatty degeneration, iron pigment in 70-80% of Kupffer's cells, leukocyte and mononucleate infiltration in the portal region and lobuli, and massive necrosis superimposed on the chronic changes typical of chronic alcoholism.

2533 THE NATURAL HISTORY OF GASTROINTESTINAL BLEEDING IN PATIENTS WITH ALCOHOLIC CIRRHOSIS. DEFINITION OF A SUBGROUP OF PATIENTS WITH HIGH RISK OF BLEEDING RECURRENCE [Abstract]. (Eng.) Degos, F.; Rueff, B.; Benhamou, J. P. (Hopital Beaujon, Clichy, France). *Digestion* 14(5/6):464; 1976.

2534 BLOOD LIPOPROTEINS IN FATTY LIVER [Abstract]. (Eng.) Brixova, E.; Niederland, T. R. (Comenius Univ., Sch. Medicine, Bratislava, Czechoslovakia). *Digestion* 14(5/6):500; 1976.

2535 HISTOCOMPATIBILITY ANTIGENS IN ALCOHOLIC CIRRHOSIS [Abstract]. (Eng.) Bailey, R. J.; Krasner, N.; Eddleston, A. L. W. F.; Williams, R.; Batchelor, J. R.; Kennedy, L. A. (King's Coll. Hosp. and Medical Sch., London, England). *Digestion* 14(5/6):496; 1976.

See also, 2467, 2510.

LIVER AND BILIARY TRACT

Cirrhosis

536 NEW THERAPY FOR HEPATARGIA AND HEPATIC COMA. (Por.) Martins, J.; Nogueira, F.; tos, M. L.; Peneda, J. (Hospital de Santo Antonio s Capuchos, Lisbon, Portugal). *Bol. Clin. Hosp. vis Lisb.* 35(1/4):49-55; 1973/1974.

inical trials with amantadine hydrochloride (administered by nasal intubation) are reported in four patients with liver cirrhosis, hepatargia, and hepatic encephalopathy. Two patients (a 52-yr-old woman and a 51-yr-old man) both presenting with somnolence, asterixis, and EEG disturbances showed improvement of the clinical symptoms and EEG tracing after treatment (200 mg x 2 at 1- to 2-hr intervals). A 52-

yr-old man with hepatargia, somnolence, and mental confusion regained consciousness and had good mental orientation 12 hr after treatment (200 mg x 3 given at 4- and 12-hr intervals). No EEG tracings were recorded in this patient. A 65-yr-old comatose man with portacaval shunt, hepatargia, and low EEG frequencies showed no improvement from two doses of 200 mg and 300 mg, resp., given at 1.5-hr intervals; he died 12 hr after the administration of the first dose. These preliminary results are promising, and appear to be superior to those previously obtained with L-dopa.

2537 HEPATIC OCCLUSION VENOGRAPHY WITH A BALLOON CATHETER IN PATIENTS WITH END-TO-SIDE PORTACAVAL SHUNTS.

(Eng.) Novak, D.; Butzow, G. H.; Becker, K. (Univ. Hosp. Eppendorf, Hamburg, W. Germany). *Am. J. Roentgenol.* 127(6):949-953; 1976.

Eight patients with patent end-to-side portacaval shunts were examined by hepatic occlusion venography with the aid of a Swan-Ganz balloon catheter to study the collaterals found in the gallbladder after this type of shunt and to determine whether the bridging anastomoses developing between both sides of the intersected portal venous system after the procedure have hemodynamic or clinical significance in the postoperative course. Hepatic occlusion venography was used to avoid the disadvantages of the wedging procedure and to provide more reliable data. Seven patients had retrograde filling of portal vein branches and portosplanchnic collaterals. The only patient without collaterals had congenital periportal fibrosis. Tiny collaterals in the gallbladder region and large bridging anastomoses were found in four patients. Three patients had more than one type of collateral. The frequency and size of collateral formation suggest possible hemodynamic and clinical significance.

2538 SURFACE FEATURES OF CIRRHOTIC LIVER.

(Eng.) Nopanitaya, W.; Grisham, J. W.; Carson, J. L.; Dotson, M. M. (Sch. Medicine, Univ. North Carolina at Chapel Hill, Chapel Hill, NC 27514). *Virchows Arch.* [*Pathol. Anat.*] 372(2):97-108; 1976.

The surface features of single cells and of multicellular tissue units in rat livers made cirrhotic by concurrent treatment with phenobarbital and carbon tetrachloride were studied by scanning electron microscopy (SEM). Connective tissue septa consisted of a loose mesh-work of fibers in which fibroblasts were embedded. The arrangement and surface features of hepatocytes in cirrhotic nodules differed from those found in parenchyma of normal livers. Hepatocytes in cirrhotic nodules universally formed plates two cells thick. The portion of the hepatocyte surface covered by microvilli was greatly increased in cells from cirrhotic livers, and this was reflected in a corresponding reduction in the area occupied by the smooth-surfaced narrow intercellular space. Canaliculi between hepatocytes in cirrhotic livers were reduplicated and frequently branched. Hepatocyte surfaces covered by microplicae and flattened microvilli, typical of connective tissue-facing surfaces in normal livers, were greatly increased in cirrhotic livers, corresponding to the increase in connective tissue. At the points where hepatocytes directly contacted fibroblasts (and not fibers), their surfaces were smooth. Sinusoidal endothelial cells in cirrhotic livers contained only isolated, relatively sparse pores, and they lacked both sieve plates (pore complexes) and large fenestrations. This study demonstrates that hepatocyte surfaces and sinusoidal endothelial cells in cirrhotic livers differ considerably from those of normal liver. Most of the surface alterations probably reflect changes in cellular micro-environments or represent adaptive changes to altered physiologic conditions, such as blood and bile flow.

2539 DEMONSTRATION OF AN INTRACELLULAR COPPER-BINDING PROTEIN BY ORCEIN STAINING IN LONG-STANDING CHOLESTATIC LIVER DISEASES.

(Eng.) Salaspuro, M.; Sipponen, P. (Second Dept. Medicine, Univ. Helsinki, 00290 Helsinki 29, Finland). *Gut* 17(10):787-790; 1976.

The location and the association of orcein-positive material was compared histologically with the occurrence of copper in liver biopsies from eight patients with primary biliary cirrhosis, two with chronic active hepatitis of a cholestatic form, three with longstanding alcoholic liver cirrhosis, and one with extrahepatic biliary obstruction. In each case, dark brown cytoplasmic material was seen after staining of the tissue sections with Shikata's orcein method. In exactly the same cellular and subcellular locations as the orcein-positive material, and with morphologically equal granules, two different ordinary staining methods for copper (rubeanic acid and Mallory-Parker's hematoxylin) gave positive reactions Earlier histochemical findings have revealed the protein nature and high sulfhydryl content of the orcein positive material. Its close association with copper in liver sections suggests its copper-binding nature and indicates that a common copper-protein complex accumulates in the cytoplasm of liver cells during longstanding cholestasis in biliary diseases of various pathogenetic origins.

2540 X-RAY MICROANALYSIS OF COPPER ACCUMULATION IN LIVER SECONDARY BILIARY CIRRHOSIS.

(Eng.) Sipponen, P.; Hjelt, L.; Tornkvist, T.; Salaspuro, M. (Central Lab. Pathology, Univ. Helsinki, Haarmaninkatu, 3, SF-00290 Helsinki 29, Finland). *Arch. Pathol. Lab. Med.* 100(12):664-666; 1976.

X-ray microanalysis was carried out in liver biopsy sections from three patients with biliary cirrhosis to clarify its value in the detection of copper in histologic sections and to verify the suggested association of copper with sulfur in cholestatic liver diseases. Copper was demonstrable by x-ray microanalysis in one patient in whom biliary cirrhosis was caused by cholestatic liver disease associated with ulcerative colitis, but not in the two patients with primary biliary cirrhosis. The liver specimens of the patient with secondary biliary cirrhosis showed histochemically extreme amounts of copper in the liver cells. Copper could be seen by x-ray analysis as a few single accumulations if the sections were screened blindly. Iron was present in 1 of 10 copper accumulations studied consecutively. Zinc, nickel, cobalt, lead, manganese, chromium, vanadium, titanium, selenium, mercury, and gold were not detected. All copper accumulations contained sulfur, which was not found in measurable quantities at other sites. Calculations of relative quantities suggested that the molecular ratio of sulfur to copper in the accumulations was 2:1. The results support the suggestion that copper is bound to apoprotein through sulfhydryl groups within the hepatocytes of patients with cholestatic liver diseases and Wilson's disease.

2541 MORPHOLOGICAL TYPES OF HEPATOCELLULAR HYALIN IN INDIAN CHILDHOOD CIRRHOSIS: AN ULTRASTRUCTURAL STUDY.

(Eng.) Nayak, N. C.; Roy, S. (All India Inst. Medical Sciences, New Delhi, India). *Gut* 17(10):791-796; 1976.

he ultrastructure of morphological variants of intrahepatocytic hyalin in Indian childhood cirrhosis as investigated. The hyalin, morphologically identical to Mallory's alcoholic hyalin, was encountered in three different forms. The most frequent orm occurred as irregular masses of randomly riented interwoven fibrils admixed with electron ense granules. The next most common form, which ccurred almost as frequently as the first form, as composed of smudgy, homogeneous or finely gran- lar electron-dense material with no discernible ibrillary structure. The least common type of yalin appeared as closely packed bundles of fine ibrils arranged in parallel arrays. These fibrils ad a "finger-print" appearance. Fragmented ndoplasmic reticulum and ribosomes were frequent- y associated with hyalin, suggesting that these rganelles contribute to their formation.

542 25-HYDROXYLATION OF VITAMIN D IN PRIMARY BILIARY CIRRHOSIS.

(Eng.) Skinner, R. .; Sherlock, S.; Long, R. G.; Wills, M. R. (Royal ree Hosp., Pond St., London NW3 2QG, England). *ancet* 1(8014):720-721; 1977.

he ability of 39 patients with symptomatic primary iliary cirrhosis to 25-hydroxylate vitamin D was nvestigated by measuring serum 25-hydroxyvitamin D 25-OHD) before and after the i.m. injection of itamin D_2 (100,000 U). By the 12th day after the njection, basal serum 25-OHD had increased sig- ificantly in eight normal controls ($p<0.01$) and in even controls with osteomalacia ($p<0.01$), but not n seven previously untreated cirrhosis patients mean incremental values were 2.3 ± 1.7, 4.6 ± 2.7, nd 0.9 ± 2.4 ng/ml, resp.). Twenty-three of 25 irrhotic patients on regular vitamin D therapy monthly i.m. injections of 100,000 U for 6-72 nths) had normal serum 25-OHD values. The results ndicate that serum 25-OHD concentrations become rmal in primary biliary cirrhosis if adequate amounts of vitamin D are presented to the liver as substrate.

2543 EFFECT OF PORTAL-SYSTEMIC ANASTOMOSIS OF RENAL HAEMODYNAMICS IN CIRRHOSIS.

(Eng.) Ring-Larsen, H.; Hesse, B.; Stigsby, B. (Rigshospitalet, Univ. Hosp., Copenhagen, Denmark). *Gut* 17(11):856-860; 1976.

Central hemodynamics, portal pressure, and mean renal blood flow (RBF) were investigated immediately before and 2-7 months after portal-systemic shunt in 11 patients with advanced alcoholic or idiopathic cirrhosis and in a 28-yr-old female with presinusoidal portal hypertension of unknown etiology. Before the operation, the renal blood flow was significantly lower ($p<0.01$) in the patients (1.95 ml/g/min) than in controls (3.50 ml/g/min); after the portal-systemic shunt, it was unchanged (1.88 mg/g/min). Mean values of plasma volume (l), blood volume (l), cardiac output (l/min), stroke volume (ml), mean arterial blood pressure (mm Hg), intrasplenic pressure (mm Hg), and wedged hepatic venous pressure (mm Hg) before surgery were 3.93 ± 0.23, 5.68 ± 0.36, 5.56 ± 0.36, 72 ± 5, 87 ± 3, 29 ± 1, and 24.3 ± 2.0, resp. After the operation, the corresponding values were 4.01 ± 0.18, 5.68 ± 0.25, 6.76 ± 0.42, 92 ± 7, 82 ± 4, 17 ± 1, and 20.5 ± 2.0, resp. Since portal pressure decreased significantly after the portal-systemic shunt, a direct portal-renal, neural, or humoral reflex mechanism does not explain the subnormal renal blood flow values in cirrhosis, and since plasma volume was large and unchanged after the operation, a diminished circulating plasma volume is an unlikely explanation. It appears that previously postulated causes of renal hypoperfusion in cirrhosis need revision.

2544 PRIMARY BILIARY CIRRHOSIS WITH SCLERODERMA AND HYPOTHYROIDISM.

(Dut.) de Graaf, P.; van der Meer, J. W. M.; Schrijver, H. (Academisch Ziekenhuis, Leiden, Netherlands). *Tijdschr. Gastroenterol.* 18(3):151-160; 1975.

A woman with primary biliary cirrhosis was followed up for 21 yr. She was aged 50 yr at the onset of the disease. Hypothyroidism due to autoimmune thyroiditis was diagnosed 8 yr after the onset of the primary biliary cirrhosis. Systemic scleroderma was diagnosed during the 20th yr of follow-up. The patient developed cardiac insufficiency and died of progressive renal insufficiency. The triad of primary biliary cirrhosis, autoimmune thyroiditis, and systemic sclerosis is believed to belong to the idiopathic autoimmune diseases. Primary biliary cirrhosis and autoimmune thyroiditis are assumed to be due to cellular autoreactivity caused by yet unknown, but probably exogenous, factors. An immunological relation is likely to exist between the three diseases. It is not yet known whether this is due to the primary affection of the immune system or to the simultaneous lesion of several organs, or whether the primary lesion of one organ gives rise to the lesion of other organs by way of cross-antigenicity.

2545 PIGMENTED CORNEAL RINGS IN NON-WILSONIAN LIVER DISEASE. (Eng.) Fleming, C. R.; Dickson, E. R.; Wahner, H. W.; Hollenhorst, R. W.; McCall, J. T. (Mayo Clinic, Rochester, MN 55901). *Ann. Intern. Med.* 86(3):285-288; 1977.

The cases of four patients with non-Wilsonian liver disease who were found to have pigmented corneal rings are described. Eighty-one consecutive patients with primary biliary cirrhosis were examined with the slit-lamp in the course of their medical evaluation. Three patients were found to have corneal rings. A fourth patient presented with chronic active hepatitis in relapse 2 months after discontinuing prednisone therapy; cirrhosis was also present. Hepatic copper, serum copper, urinary copper, and serum ceruloplasmin concentrations were significantly elevated in all patients with primary biliary cirrhosis. Radiocopper (^{64}Cu or ^{67}Cu) plasma disappearance curves clearly differentiated patients with primary biliary cirrhosis from those with Wilson's disease. Three of the patients with primary biliary cirrhosis showed a secondary rise in radiocopper that presumably represented copper incorporation into ceruloplasmin. In one patient in whom ^{64}Cu in ceruloplasmin was studied specifically, incorporation was normal. An unexplained finding in the patient with chronic aggressive hepatitis was a very high serum iron level of 313 μg/dl (89% saturation) and desferrioxamine chelatable iron of 1,248 μg. However, her hepatic and bone marrow iron stores were not excessive. None of the four patients had a family history of hepatic, neurologic, or psychologic disease, and none showed neurologic or psychiatric disorders. Pigmented corneal rings in the presence of chronic liver disease without neurologic disease can be seen in Wilson's disease, primary biliary cirrhosis, and chronic active liver disease. These diseases can be differentiated with the help of history, immunologic and biochemical variables, chemical tests for copper metabolism, and radiocopper kinetics.

2546 ALBUMIN THERAPY: AN OVERVIEW. (Eng.) Lister-Rosenoer, L. M.; Robertson, W. S., II; Rosenoer, V. M. (Harvard Medical Sch., Boston, MA). *Lahey Clin. Found. Bull.* 26(1):16-24; 1977.

2547 MITOCHONDRIAL AND MICROSOMAL ALTERATIONS IN CIRRHOSIS [Abstract]. (Eng.) Escartin, P.; Rossi, I.; Diaz-Gil, J.; Gosalvez, M. (Dept. Gastroenterology, Clinica Puerta de Hierro, Madrid, Spain). *Digestion* 14(5/6):506-507; 1976.

2548 BRANCHED-CHAIN AND AROMATIC AMINO ACIDS IN PATIENTS WITH CIRRHOSIS [Abstract]. (Eng.) Salerno, F.; Dioguardi, F.; Manneschi, M.; Fiorelli, G.; Dioguardi, N. (Istituto di Clinica Medica III, Universita degli Studi di Milano, Milan, Italy). *Digestion* 14(5/6):546-547; 1976.

2549 RADIOIMMUNOASSAY OF SERUM CHOLIC ACID AND CHENODEOXYCHOLIC ACID CONJUGATES IN PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Barbara, L.; Roda, A.; Festi, D.; Sama, C.; Aldini, R.; Mazzella, G.; Roda, E. (Cattedra di Gastroenterologia, dell'Universita di Bologna, Policlinico S. Orsola, Bologna, Italy). *Digestion* 14(5/6):497-498; 1976.

2550 RELATION BETWEEN BILE ACID SECRETION RATES AND THE ABSENCE OF BILIARY DEOXYCHOLIC ACID (DCA) IN CIRRHOSIS [Abstract]. (Eng.) Boedeker, E. C.; Kinsey, M. D.; Knodell, R. G. (Walter Reed Army Hosp., Washington, DC). *Clin. Res.* 24(5): 627A; 1976.

2551 ESTROGEN METABOLISM IN HEPATIC CIRRHOSIS: COMPARISON BETWEEN PATIENTS WITH AND WITHOUT ASCITES [Abstract]. (Eng.) Preedy, J. R. K.; Musey, P.; Schmidt, F. H.; Collins, D. C. (Dept. Medicine, Emory Univ., Atlanta, GA). *Clin. Res.* 25(1):50A; 1977.

2552 GLUCOSE TOLERANCE AND FOREARM CONSUMPTION OF GLUCOSE IN CRYPTOGENIC CIRRHOSIS [Abstract]. (Eng.) Record, C. O.; Leatherdale, B.; Chase, R. A.; Williams, R. (London Hosp., London, England). *Digestion* 14(5/6):541; 1976.

2553 β-ADRENORECEPTOR BLOCKADE ON RENIN-ALDOSTERONE AXIS AND SODIUM EXCRETION IN CIRRHOSIS [Abstract]. (Eng.) Wilkinson, S. P.; Bernardi, M.; Smith, I.; Jowett, T.; Slater, J. D. H.; Williams, R. (King's Coll. Hosp. and Medical Sch., London England). *Digestion* 14(5/6):473; 1976.

2554 BEHAVIOUR OF PLASMA RENIN ACTIVITY AND PLASMA ALDOSTERONE DURING ASCITIC FLUID REINFUSION [Abstract]. (Eng.) Martin, A.; Sturniolo G. C.; Borsatti, A.; Montanaro, D.; Naccarato, R. (Dept. Gastroenterology, Univ. Padova, Padova, Italy) *Digestion* 14(5/6):533; 1976.

2555 THE TRANSFER-DEFECT IN PATIENTS WITH CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Schomerus, H. (Medizinische Universitatsklinik, Abteilung I, Tubingen, W. Germany). *Digestion* 14(5/6): 548; 1976.

2556 A CONTROLLED TRIAL OF D-PENICILLAMINE THERA PY IN PRIMARY BILIARY CIRRHOSIS AND CHRONI ACTIVE HEPATITIS [Abstract]. (Eng.) Jain, S.; McGe J. O'D.; Scheuer, P. J.; Samourian, S.; Sherlock, S. (Royal Free Hosp., London, England). *Digestion* 14(5/6):523; 1976.

2557 SIGNIFICANCE OF ACTIVITY IN SELECTION OF PATIENTS WITH NON-ALCOHOLIC CIRRHOSIS FOR PREDNISONE TREATMENT [Abstract]. (Eng.) Schlichtin P.; Dietrichson, O.; Juhl, E.; Poulsen, H.; Tygstrup N. (Kommunehospitalet, Copenhagen, Denmark). *Digestion* 14(5/6):465-466; 1976.

2558 EVIDENCE THAT POTASSIUM DEPLETION DOES NOT OCCUR IN CIRRHOSIS WITH ASCITES [Abstract]. (Eng.) Mas, A.; Piera, C.; Bosch, J.; Arroyo, V.; Roca, M.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 14(5/6): 467; 1976.

2559 INCIDENCE OF PRIMARY LIVER CELL CARCINOMA IN LIVER CIRRHOSIS: 5-YEAR PROSPECTIVE STUDY [Abstract]. (Eng.) Lehmann, F. G.; Martini, G. A. (Dept. Medicine, Univ. Marburg/Lahn, Marburg, W. Germany). *Digestion* 14(5/6):530-531; 1976.

2560 POST-SHUNT ENCEPHALOPATHY IN CIRRHOTIC PATIENTS [Abstract]. (Eng.) Grange, D.; Franco, D.; Bismuth, H. (Hopital Paul Brousse, Villejuif, France). *Digestion* 15(3):240-241; 1977.

2561 TREATMENT OF CIRRHOTIC HEPATIC ENCEPHALOPATHY BY L-DOPA. A DOUBLE-BLIND STUDY)F 58 PATIENTS [Abstract]. (Eng.) Michel, H.; auvet, G.; Granier, P. M.; Bali, J. P.; Andre, R.; uilleret, G. (Hopital Saint-Eloi, Montpellier, rance). *Digestion* 15(3):232-233; 1977.

562 SERIAL ENDOSCOPY IN CIRRHOTIC PATIENTS WITH REPEATED EPISODES OF HAEMORRHAGE Abstract]. (Eng.) Bordas, J. M.; Bru, C.; eres, J.; Rodes, J. (Hospital Clinico y Provincial, arcelona, Spain). *Digestion* 14(5/6):498-499; 1976.

2563 WHY DO SOME CIRRHOTIC PATIENTS BLEED FROM VARICES AND OTHERS FROM ACUTE ULCERS [Abstract]? (Eng.) Franco, D.; Durandy, Y.; Deporte, A.; Bismuth, H. (Hopital Paul Brousse, Paris, France). *Digestion* 14(5/6):511; 1976.

2564 ELECTRON MICROSCOPY OF A HEPATIC GANGLIONEUROBLASTOMA WITH SPECIAL REFERENCE TO LONG SPACING COLLAGEN AND TO PORTAL HYPERTENSION. (Eng.) Knapp, W. A.; Ruebner, B. H. (Univ. California Medical Center, Sacramento, CA 95616). *Beitr. Pathol.* 157(2):200-207; 1976.

2565 PORTAL DIVERSION FOR PORTAL HYPERTENSION IN CHILDHOOD [Abstract]. (Eng.) Bismuth, H.; Franco, D.; Alagille, D. (Hopital Paul Brousse, Villejuif, France). *Digestion* 15(3):235-236; 1977.

See also, 2177, 2198, 2395, 2448, 2466, 2469, 2528, 2573, 2582, 2603.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

66 FACTORS INTERFERRING [sic] WITH THE OPACIFICATION OF A NORMAL GALLBLADDER. (Eng.) jahed, Z. (525 E. 68 St., New York, NY 10021). *strointest. Radiol.* 1(2):183-185; 1976.

trinsic factors that will interfere with the satisctory opacification of a normal gallbladder are esented. These include: faulty instructions to e patient, excessive diarrhea and vomiting (likely occur with larger doses than recommended), small testinal resection and gastrointestinal anastomoses, sease of the small intestine (especially malsorptive diseases), liver disease anastomoses or stulous formation between the biliary system and e gastrointestinal tract, inadequate opacification me, cholestasis due to a low-fat diet, and pancreatic diseases. Some of these factors are inequent, but as a group they become significant. less they are ruled out, they may lead to the roneous diagnosis of nonopacification because disease.

2567 DISEASE OF THE GALLBLADDER IN PATIENTS WITH NORMAL CHOLECYSTOGRAMS. (Eng.) Andersson, A.; Bergdahl, L. (Central Hosp., S-291 85 Kristianstad, Sweden). *Am. J. Surg.* 132(3):322-324; 1976.

Eight cases of gallbladder disease in which the cholecystogram was false-negative are described; one illustrative case report is presented. The survey consisted of 5,000 patients who had been subjected to cholecystectomy between July 1962 and May 1974. Among the eight patients with false-negative cholecystograms, seven were women. Six patients had been examined up to nine times with cholecystography or cholegraphy. The symptoms were typical of gallbladder disease and moderately severe. Four patients had gallbladder stones, while the remaining four had only cholesterolosis of the gallbladder. Two patients had had recurrent attacks of pancreatitis. The patient whose case report is presented was a 73-yr-old man whose history included duodenal ulcer and biliary colic attacks. The patient presented with acute pancreatitis with an abnormally elevated serum amylase level. Cholecystography was normal and continued to be normal on six subsequent occasions, when the patient was hospitalized for recurrent attacks of pancreatitis and symptoms suggestive of gallbladder disease. Laparotomy 13 yr later revealed postinflammatory changes around the gallbladder and, adjacent to the gallbladder bed, a liver abscess, which was drained. The gallbladder mucosa contained several cholesterol polyps that had not been shed. Operative cholangiography showed that the common bile duct was 10 mm wide and contained no stones. The patient remains asymptomatic 9 months after cholecystectomy.

2568 CHIBA PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. A VALUABLE METHOD FOR VISUALIZING THE NONDILATED BILIARY TRACT.

(Eng.) Tabrisky, J.; Lindstrom, R. L.; Hanelin, L. G.; Pfisterer, W. F. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *Am. J. Roentgenol.* 126(4):755-760; 1976.

Percutaneous transhepatic cholangiography (PTC) is the procedure of choice for diagnosis of lesions that obstruct the biliary tract. Japanese investigators have developed a long, thin sheathless (Chiba) needle to replace the large, sheathed needle originally used in this procedure. The Chiba needle reduces the risk of major complications, but more importantly, it allows the visualization of normal (nondilated) or small bile ducts. As examples of the value of Chiba PTC, four remarkable case histories are presented in which Chiba PTC resolved the lesion where other diagnostic procedures failed. The success rate for Chiba PTC, especially in cases with small, nondilated ducts, is very high, with extremely few major complications (1 in 120 cases). The major advantages of Chiba PTC are technological ease, small needle size, and ability to cannulate small ducts. This procedure can save the patient from needless exploratory surgery. The authors conclude that the technique is a valuable primary procedure or alternative to endoscopic retrograde cholangiography.

2569 A HISTOPATHOLOGICAL STUDY OF THE REMNANT OF EXTRAHEPATIC BILE DUCT IN SO-CALLED UNCORRECTABLE BILIARY ATRESIA.

(Eng.) Miyano, T.; Suruga, K.; Tsuchiya, H.; Suda, K. (Juntendo Univ. Sch. Medicine, 3-1-3 Hongo, Bunkyo-ku, Tokyo, Japan). *J. Pediatr. Surg.* 12(1):19-25; 1977.

Histopathological studies of remnants of extrahepatic bile duct and wedge liver biopsies were performed in 40 cases of so-called uncorrectable biliary atresia treated by hepatic portoenterostomy. Histological specimens were classified into three types: type I, the inside diameter of the bile duct was more than 100 μm, and there was not much inflammatory change in surrounding tissue (type Ia, ductal inside diameter greater than 300 μm; type Ib, ductal inside diameter less than 300 μm); type II, the inside diameter of the bile duct or ductuli was less than 100 μm, with small round cell infiltration and vessel proliferation in surrounding tissue; and type III, fibrosis without any ductal structure. In terms of correlation between the histological findings and the region of the remnant of the extrahepatic bile duct, the incidences of type I specimens in the areas of the porta hepatis, hepatic duct, choledochus, and gallbladder were 25% (2 type Ia and 8 type Ib), 24% (0 type Ia and 8 type Ib), 34% (7 type Ia and 4 type Ib), and 37% (33 type Ia and 4 type Ib), resp. The corresponding incidences for type II specimens were 58% (23 cases), 26% (9 cases), 13% (4 cases), and 2.5% (1 case), resp. The corresponding incidences of type III specimens were 17% (7 cases), 50% (17 cases), 53% (17 cases), and 2.5% (1 case), resp. The older the patient, the smaller the size of the duct at the porta hepatis and the more advanced hepatic fibrosis. Patients aged 2.5 months showed a 57% incidence of type I specimens and a 0% incidence of type III specimens, whereas patients between 3 and 4 months of age showed a 14% incidence of type I specimens and a 29% incidence of type III specimens. Type I specimens at the porta hepatis were associated with a 40% incidence of type I fibrosis and a 30% incidence of type III fibrosis, whereas type III specimens were associated with a 0% incidence of type I fibrosis and a 57% incidence of type III fibrosis. It is recommended that the operation be performed at as early an age as possible.

2570 RAPID ROENTGENOLOGIC DIAGNOSIS OF ACUTE CHOLECYSTITIS.

(Eng.) Danley, R. B.; Love, L.; Pickleman, J. R. (Loyola Univ. Medical Center, Maywood, IL). *Surg. Gynecol. Obstet.* 143(4): 602-604; 1976.

A new rapid method of roentgenographic visualization of the acutely inflamed gallbladder is described; this technique, infusion tomography, was performed 146 times, and the results are presented. With the patient in the prone position and using a low kV peak technique, linear tomographic scout films are taken. Sixty percent meglumine diatrizoate (2.2 ml/kg) mixed with 5% glucose and water is rapidly infused i.v. Immediately after the infusion, tomographic sections of the anterior third of the abdomen are taken at 1-cm levels. Of the 146 patients who underwent this procedure, 67 underwent cholecystectomy, 51 having had an abnormal infusion tomogram and 16, normal linear tomograms. Of the 27 patients with histologically proven acute or chronic cholecystitis with superimposed acute cholecystitis, 26 had an abnormal infusion tomogram. In patients with subacute or chronic cholecystitis, the correct positive result rate was 64%. There were no false-positive results. In view of the high false-negativ rate in instances of subacute and chronic cholecystitis, it is advised that all normal roentgenograms be followed by p.o. cholecystography.

2571 THE EFFECT OF HEPATIC BILE ON RETAINED COMMON DUCT STONES.

(Eng.) Thurston, O. G.; McDougall, R. M. (Dept. Surgery, Univ. Alberta, Edmonton, Alberta, Canada). *Surg. Gynecol. Obstet.* 143(4):625-627; 1976.

The natural history of 91 patients with common duct stones presenting clinically after cholecystectomy was examined, and data indicating the effect of hepatic bile on common duct stones after cholecystectomy were obtained. Nine of the 91 patients were judged to have primary common duct stones, and the remaining 82 patients had secondary stones, which were multiple in 41 instances. In contrast to the theoretic incidence curve for patients with choledocholithiasis presenting after cholecystectomy, the actual plot for the 91 patients showed a bimodal distribution, with an early peak in the first year, followed by a second peak at 3 yr after cholecystectomy. Three years after cholecystectomy, there was a gradual diminution in the number of patients who presented with stones each year up to 54 yr after cholecystectomy. It is concluded that retained common duct stones increase in size with the passage of time, eventually becoming large enough to be symptomatic. In these patients, bile is thought to remain supersaturated with cholesterol after cholecystectomy.

2572 ABNORMALITIES IN GALLBLADDER MORPHOLOGY AND FUNCTION IN PATIENTS WITH CHOLELITHIASIS. (Eng.) Nahrwold, D. L.; Rose, R. C.; Ward, S. P. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Ann. Surg.* 184(4):415-421; 1976.

Relations between clinical manifestations, histologic findings, and gallbladder absorptive capability were studied in 37 symptomatic cholelithiasis patients who underwent cholecystectomy. Clinical scoring was based on symptoms within 7 days of surgery, degree of abdominal tenderness, nonvisualization on cholecystogram, left shift differential count, previous acute cholecystitis, and fever or elevated WBC during prior attack. Histologic scoring (light microscopy) was based on fibrosis, mucosal diverticula (Rokitansky-Aschoff sinuses), cholesterolosis, muscle thickening, and inflammatory cell infiltrate; the presence of plasma cells and eosinophils was assessed separately. Short-circuit current measurements, which reflect gallbladder sodium absorption, were used to assess absorptive function. Patients with clinical scores of 0-3, indicative of minimal clinical signs and symptoms, had a mean histologic score of 6.5 ± 0.6 and a mean short-circuit current of 64 ± 6 μamp, whereas patients with clinical scores of 4-8 had a mean histological score of 11.6 ± 1.3 and a mean short-circuit current of 39 ± 9 μamp. The differences between the two histological and the two short-circuit current means were significant ($p<0.01$ and $p<0.05$, resp.). A significant linear relation ($r=0.78$) existed between short-circuit current values and histologic scores. The linear relations between clinical scores and histologic scores ($r=0.64$) and short-circuit current values and clinical scores ($r=0.58$) were less significant. The mean short-circuit (64 ± 6 μamp) for gallbladders that visualized on p.o. cholecystography was significantly higher ($p<0.02$) than the mean value (32 ± 11 μamp) for gallbladders that did not visualize, but there was considerable overlap between the two groups. Visualization on p.o. cholecystography does not appear to be a reliable measure of gallbladder absorptive capacity.

2573 INCREASED INCIDENCE OF CHOLELITHIASIS IN LIVER CIRRHOSIS. ANALYSIS OF THE CAUSES OF INCREASED FREQUENCY. (Spa.) Viveros, J. G.; Villalobos, J. J.; Wolpert, E. (Departamento de Gastroenterologia, Instituto Nacional de la Nutricion San Fernando y Viaducto, Tlalpan, Mexico 22, D.F.). *Rev. Invest. Clin.* 27(4):269-273; 1975.

The files of 10,000 patients treated at the Instituto Nacional de la Nutricion during 1970-1973 were reviewed for cases of liver cirrhosis (339) or cholelithiasis (601) and were statistically analyzed for lithiasis. Cirrhosis was determined by clinical examination and liver function tests, with confirmation by biopsy or autopsy in most cases. Cholelithiasis was diagnosed by radiology (negative oral cholecystogram: inconclusive). There were 41 cases of cholelithiasis among 339 cirrhosis patients and only 601 cases of cholelithiasis among 9,661 noncirrhotics. Cholelithiasis occurred in 442 men and 118 women with cirrhosis. In noncirrhotics, cholelithiasis was found in 19 men and 22 women. Chronic hemolysis seemingly explains increased pigmented gallstones in liver cirrhosis.

2574 CHOLELITHIASIS IN PERSONS UNDER 25 YEARS OLD: CLINICOPATHOLOGIC REVIEW OF 96 CASES. (Eng.) Goodman, D. B. (Naval Regional Medical Center, 7500 E. Carson St., Long Beach, CA 90801). *JAMA* 236(15):1731-1732; 1976.

The clinicopathologic features of cholelithiasis in 96 surgically treated patients between 7 and 25 yr of age were studied. Although females predominated in a ratio of 4:1, the sex incidence was equal when nulliparous females were compared with males. Early in the course of the disease, the symptoms were usually nonspecific. Only 28 patients experienced acute upper abdominal pain at some time in their course, and 4 patients noted jaundice in addition to abdominal pain. There was a delay in proper diagnosis in 26% of the patients; the total duration of symptoms to diagnosis was up to 1 month in 9 patients, 2-12 months in 56 patients, 1-5 yr in 24 patients, and over 10 yr in 1 patient. Only two patients had an underlying blood dyscrasia. The most reliable diagnostic test was p.o. cholecystography. All patients underwent cholecystectomy. The incidence of choledocholithiasis was 4.1%. The data indicate that cholelithiasis occurs frequently in patients younger than 25 yr in the absence of hemolytic disease or history of pregnancy.

2575 PIGMENT GALLSTONES. (Eng.) Soloway, R. D.; Trotman, B. W.; Ostrow, J. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 72(1):167-182; 1977.

The composition of pigment gallstones, experimental gallstone production, and the features that distinguish patients with pigment stones from those with cholesterol stones are reviewed, and the treatment and etiology are discussed. Pigment gallstones are defined as any dark brown-to-black stone, consisting of calcium salts of bilirubin, phosphate, carbonate and other anions; it can be separated into carbonate- and noncarbonate-containing groups. Pigment stones predominate in the rural Orient, in cirrhosis, and in elderly patients in the U.S. undergoing cholecystectomy. Clinical associations include bile duct obstruction, stasis, and possibly hemolysis. Fifty percent of pigment stones are radiopaque and account for two-thirds of all opaque stones. The concentrations of bile salts, phospholipids, cholesterol, and total bilirubin in bile are similar to normal levels, but the concentration of unconjugated bilirubin is increased in the bile of some patients. Increased unconjugated bilirubin in bile may be caused by increased hydrolysis of excreted conjugated bilirubin. Unconjugated bilirubin is solubilized by bile salts, but the interaction is primarily nonmicellar. Ionized calcium and pH are important determinants of solubility. Sulfated glycoproteins, excreted in increased amounts in patients with cholelithiasis, may be the site of pigment stone precipitation because these compounds bind calcium salts tightly. *Escherichia coli* is frequently cultured from pigment stones in Japan, but not in the U.S.; thus, bacterial β-glucuronidase may be important in stone formation in Japan, but probably not in the West. Stasis leads to increased calcium secretion and to increases in the concentration of sparingly soluble compounds that may then precipitate. Incomplete emptying of the gallbladder may result in the same concentration process. Unsaturated fats and chronic vagal stimulation cause pigment stone formation in animals. Surgery is presently the only treatment for pigment lithiasis.

2576 THE WORLD DISTRIBUTION OF GALLSTONES.

(Eng.) Brett, M.; Barker, D. J. P. (Southampton General Hosp., Southampton SO9 4XY, England). *Int. J. Epidemiol.* 5(4):335-341; 1976.

A summary of all available published data since 1890 on the world distribution of gallstones, as recorded from autopsy studies, is presented. From 1940 onwards, the mean prevalence recorded in European countries was 18.5%, with the lowest value being recorded in Dublin, Ireland (5%) and the highest in Malmo, Sweden (38%). Before 1940, the mean prevalence was 10.5%, with the lowest value being found in London in 1911 (3%) and the highest in Vienna in 1927 (32%). The male:female ratio for prevalence is about 1:2. Mixed cholesterol stones were found most often. In America, the mean prevalence in whites and negroes from 1940 onwards were 9 and 24%, resp. The mean prevalence for pre-1940 surveys was 9.4%, with the lowest value being recorded in Chicago in 1918 (3%) and the highest in Rochester (22%). High prevalences of 24, 30, and 32% were recorded among American Indians during studies performed in the 1960's. High values of 15, 21, and 35% were also found in recent surveys in Santiago, Chile. The overall male:female ratio in North America whites is about 1:2 and in negroes 1:3. Prevalence among whites is approximately twice that among negroes. Stones in Americans are mostly of the mixed cholesterol type. Low prevalences have been recorded in Africa, other than South Africa (less than 1%), and in Asia (7% for Singapore), where the majority of stones are of the pigmented type. In South Africa, the prevalence among whites ranges from 14 to 17% and in the Bantu, from 2-5%. Females are affected about twice as often as males. Whites have mainly mixed cholesterol stones, while the majority of stones in the Bantu are pigmented. Data for Brisbane, Australia in 1971 showed a prevalence of 31%; earlier studies in Adelaide and Melbourne revealed lower values of 11, 13, and 15%. The male:female ratio was about 1:2. Additional studies, especially in Asia, Russia, the Middle Eastern and Mediterranean countries, and South America, are needed to help clarify the etiology of gallstones.

2577 SULPHATED AND UNSULPHATED BILE ACID IN SERUM, BILE, AND URINE OF PATIENTS WITH CHOLESTASIS.

(Eng.) Van Berge Henegouwen, G. P.; Brandt, K. H.; Eyssen, H.; Parmentier, G. (St. Radboud Hosp., Nijmegen, Netherlands). *Gut* 17(11):861-869; 1976.

To gain insight into the changes occurring in bile acid metabolism in cholestasis, samples of serum, bile, and urine were collected simultaneously from 32 patients with cholestasis of varying etiology and from 18 patients with cirrhosis; their bile acid composition was determined by gas/liquid chromatography and mass spectrometry. In cholestasis, the patterns in all three body fluids differed consistently and strikingly. In serum, cholic acid was the major bile acid, and most bile acids (>93%) were unsulphated, whereas, in urine, chenodeoxycholi acid was the major bile acid, and the majority of bi acids (>60%) were sulphated. Secondary bile acids w virtually absent in bile, serum, and urine. The tot amount of bile acids excreted for 24 hr correlated highly with the concentration of serum bile acids; patients with complete obstruction, urinary excretio averaged 71.6 mg/24 hr. In cirrhotic patients, serum bile acids were less raised, and chenodeoxycholic acid was the predominant acid. In healthy controls, serum bile acids were consistently richer in chenodeoxycholic acid than biliary bile acids, a no bile acids were present in urine. No unusual monohydroxy bile acids were present in patients wit primary biliary cirrhosis, but, in several patients, there was a considerable amount of hyocholic acid present in the urinary bile acids. The analyses of individual bile acids in serum and urine did not appear to provide helpful information in the differential diagnosis of cholestasis. Thus, in cholestasis, conjugation of chenodeoxycholic acid with sulphate becomes a major biochemical pathway, urine becomes a major route of bile acid excretion, and abnormal bile acids are formed.

2578 JAUNDICE FROM IMPACTED SEDIMENT IN A T TUBE: RECOGNITION AND TREATMENT.

(Eng.) Jelaso, D. V.; Hirschfield, J. S. (Clearwater Commu nity Hosp., Clearwater, FL 33516). *Am. J. Roentge ol.* 127(3):413-415; 1976.

he case of a 66-yr-old man in whom encrustation of
ile sediment in the proximal limb of an indwelling
-tube occluded the lumen, causing jaundice, is pre-
ented. A T-tube had been inserted across the nar-
owed segment of common hepatic duct into the left
epatic duct when adenocarcinoma of the proximal
ucts was discovered. The patient did well for 5
onths, after which jaundice occurred. The occlusion
as detected by a T-tube cholangiogram, and attempts
o disimpact the bile sediment plug by irrigation
ith saline and the use of standard and moving core
uide wires were unsuccessful. A 1.65-mm Bilbao-
otter hypotonic duodenography torque cable was suc-
essfully advanced across the occluded proximal limb
f the T-tube. Repeated saline irrigations and cable
nsertions restored patency. Torque cable disimpac-
ion of the plugged T-tube was required on several
ccasions up until the patient's death 24 months af-
er the initial admission. The insertion of a torque
able under fluoroscopic control can successfully
isimpact this type of occlusion, restoring patency
nd relieving the jaundice.

579 ENDOTOXIN, BILE SALTS AND RENAL FUNCTION IN OBSTRUCTIVE JAUNDICE. (Eng.) Bailey,
. E. (King's Coll. Hosp., London, England). *Br.*
. *Surg.* 63(10):774-778; 1976.

ndotoxemia and renal function were studied in 24
atients with obstructive jaundice who underwent
urgery for cancers of the bile duct or pancreas,
allstones, bile duct stricture, stone in the
ommon bile duct, cancer with secondary deposits,
ancer of the pancreas plus gallstones, or hepatoma
nvading the bile duct. Endotoxin in the portal
lood was seen at surgery in 16/24 jaundiced patients,
nd 13 of these had endotoxin in their peripheral
lood. Only 3 patients had proven sites of infection,
hich possibly accounted for the peripheral endotox-
mia; thus, 10 patients almost certainly developed
ortal and peripheral endotoxemia from their own
astrointestinal organisms. Only untreated patients
ith a serum bilirubin of 8.5 mg/100 ml or more had
ndotoxin in the portal blood. The mean preoperative
reatine clearance in nonendotoxin patients was
2.72 ml/min and was not significantly different
rom a preoperative value of 70.39 ml/min for endo-
oxin-positive patients. The mean postoperative
reatine clearance values in nonendotoxin and
ndotoxin patients were 93.27 ml/min and 39.69 ml/
in, resp. ($p<0.0025$). No portal or peripheral
ndotoxemia and no significant fall in postoperative
reatine clearance were observed in 16 nonjaundiced
ontrol patients. Experiments with Wistar rats,
hich underwent bile duct ligation and 12 days later
eceived sodium taurocholate (8 mg/100 g t.i.d.
2 days, p.o.) and then *Escherichia coli* endotoxin
5 mg/100 g, p.o.) and lead acetate (5 mg/100 g,
.v.) 3 hr later, indicated that absorption of
ndotoxin in the intestinal tract can be prevented
y bile salt administration.

580 ROUX-EN-Y BILIODIGESTIVE ANASTOMOSIS. INDICATIONS AND LONG-TERM CLINICAL AND
OCHEMICAL RESULTS. (Dut.) Verbeke, W.; Vanmaele,
.; Detournay, G.; Kerremans, R.; Beckers, J.; de
Groote, J. (Academisch Ziekenhuis Leuven, Louvain, Belgium). *Tijdschr. Gastroenterol.* 18(3):133-150; 1975.

Results obtained with a Roux-en-Y biliodigestive anastomosis in 26 patients with obstructive jaundice (14 patients) and intermittent cholangitis (12 patients) are presented. The postoperative mortality amounted to 1/26 (3.8%). Eighteen patients (69.2%) developed postoperative complications (wound infection, eventration, fistula, pulmonary and cardiac complications, phlebitis, septicemia, subhepatic abscess, fistula with nonfunctioning anastomosis, and choleperitoneum). Five patients (19.2%) developed stricture of the anastomosis, and duodenohemipancreatectomy was necessary in another. Twenty-two patients were followed up for up to 17 yr. The long-term subjective results were very good in 12 patients (55%), good in 2 (9%), and poor in 8 (36%). All patients in the latter group had abnormal liver function tests (bilirubin, BSP, alkaline phosphatase, and thymol and necrosis tests). Four patients developed liver cirrhosis; two of them died after an evolution of 5 yr. Roux-en-Y anastomosis is indicated principally for stenosis of the bile duct following biliodigestive anastomosis and for traumatic lesions of the bile duct leading to postoperative fistula of localized stricture.

2581 ENDOSCOPIC RETROGRADE CHOLANGIODILATATION: A PRELIMINARY REPORT. (Eng.) Lee, T. G.; Katon, R.; Freeny, P. C.; Henderson, S. C.; Bilbao, M. K. (Univ. Oregon Health Sciences Center, 3181 SW Sam Jackson Park Road, Portland, OR 97201). *Gastrointest. Endosc.* 23(3):171-172; 1977.

The case report of a patient in whom endoscopy was used to dilate a common bile duct stricture is presented. The patient, a 65-yr-old woman, had undergone choledochoduodenostomy 23 yr earlier. Endoscopic retrograde cholangiography demonstrated a tight stricture of the common bile duct. Using a 5 French Fogarty catheter outrigged to a front-viewing Olympus GIF-D panendoscope, the common bile duct was cannulated, and the inflated balloon was pulled through the stricture several times. The patient experienced no discomfort or complication. Therapeutic applications of the fiberoptic endoscope should be further investigated.

2582 CEFAZOLIN IN THE TREATMENT OF BILIARY TRACT INFECTION. (Eng.) Paulet, Ph. (Service de Medecine Interne IMTS, Tubize, Belgium). *Acta Gastroenterol. Belg.* 39(7/8):293-297; 1976.

2583 LITHOGENIC BILE IN CYSTIC FIBROSIS (CF) [Abstract]. (Eng.) Roy, C. C.; Chattrand, L.; Weber, A. M.; Morin, C. L.; Lasalle, R.; Nussle, D. (Hopital Ste-Justin, Montreal, Canada). *Clin. Res.* 24(5):666A; 1976.

2584 CHOLESTYRAMINE INDUCED CHOLESTEROL GALLSTONES IN THE BABOON [Abstract]. (Eng.) Redinger, R. N.; Grace, D. M. (Univ. Hosp., London, Ontario, Canada). *Clin. Res.* 24(5):666A; 1976.

2585 POSTOPERATIVE ACUTE ACALCULOUS CHOLECYSTITIS. (Eng.) Jonsson, P. E.; Andersson, A. (Central Hosp., S-291, 85 Kristianstad, Sweden). *Arch. Surg.* 111(10):1097-1101; 1976.

2586 LECITHIN CHOLESTEROL ACYL TRANSFERASE (LCAT) ACTIVITY AND PLASMA LIPOPROTEIN CHANGES IN OBSTRUCTIVE JAUNDICE [Abstract]. (Eng.) Agorastos, J.; Boswell, C.; Harry, D. S.; McIntyre, N. (Royal Free Hosp., London, England). *Digestion* 14(5/6):477; 1976.

2587 NADPH-CYTOCHROME C REDUCTASE ACTIVITY IN NEEDLE LIVER BIOPSIES OF PATIENTS WITH CHOLELITHIASIS BEFORE AND AFTER TREATMENT WITH CHENODEOXYCHOLIC ACID [Abstract]. (Eng.) Lorenzini, I.; Candelaresi, M. T.; Jezequel, A. M.; Orlandi, F. (General Hosp. of Ancona, Ancona, Italy). *Digestion* 14(5/6):531; 1976.

See also, 1835, 1977, 2023, 2031, 2046, 2049, 2054, 2174, 2176, 2177, 2202, 2204, 2206, 2207, 2432, 2444, 2450, 2451, 2636.

GENERAL

2588 THE EFFECTS OF TWO DIETARY FIBER SUPPLEMENTS ON GASTROINTESTINAL TRANSIT, STOOL WEIGHT AND FREQUENCY, AND BACTERIAL FLORA, AND FECAL BILE ACIDS IN NORMAL SUBJECTS. (Eng.) Baird, I. M.; Walters, R. L.; Davies, P. S.; Hill, M. J.; Drasar, B. S.; Southgate, D. A. T. (West Middlesex Hosp., Isleworth, Middlesex, England). *Metabolism* 26(2):117-128; 1977.

The effects of dietary supplements of sugar cane fiber (bagasse) on stool weight, solids, and water content were studied in 20 normal women over a 9-month period; a second inpatient study was done with bran supplements in four subjects. The addition of 10.5 g of bagasse containing 5.1 g of crude fiber to a normal diet containing 3.7 g of crude dietary fiber daily raised the mean fecal weight from 88.3 ± 6.4 g to 139.7 ± 10.2 g/day ($p<0.005$). There was also a significant rise in fecal solids and fecal water, although the percentage of water in the stools remained unchanged. Bagasse supplements accelerated gastrointestinal transit when measured by the carmine marker technique. Radiopaque "shapes" showed a trend toward more rapid transit with bagasse supplements. Daily supplements of 39 g of wheat bran or 10.5 g of bagasse increased the total daily excretion of fecal bacteria, but the amount of bacteria excreted per gram of feces did not change. The composition of the bacterial flora showed no change. There was increased excretion of fecal acid sterols on the bagasse supplement, but this did not occur with bran. No changes attributable to fiber supplements occurred in the plasma triglycerides or cholesterol. Future work may define specific dietary fiber supplements for different therapeutic purposes; one fiber may be used as a bulk expander in diverticular disease and another as a hypocholesteremic fiber.

2589 DEATH IN ACUTE UPPER GASTROINTESTINAL BLEEDING: CAN ENDOSCOPY REDUCE MORTALITY? (Eng.) Logan, R. F. A.; Finlayson, N. D. C. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *Lancet* 1(7970):1173-1175; 1976.

To determine the value of an emergency endoscopy service in reducing the mortality rate from acute upper gastrointestinal bleeding, the records of 64 patients who had died during a 24-month period between 1972 and 1974 were examined. Acute gastrointestinal bleeding had resulted in hospitalization in 43 patients or had become a major clinical problem during hospitalization in 21 others. Forty-six patients were over 60 yr of age. Recurrent or continuous bleeding occurred in 24 cases; after the exclusion of 9 deaths from sudden exsanguination and of 11 deaths from bleeding varices with subsequent hepatic failure, only 4 patients died from recurrent bleeding. Other causes of death were postoperative complications (20) and other seve concomitant disease (20). These results suggest that improved diagnostic techniques, such as endosco may not significantly reduce the mortality from acut upper gastrointestinal bleeding.

2590 THE PATIENT WITH ACUTE DIARRHEA: AN ALGORITHM FOR DIAGNOSIS. (Eng.) Satterwhite, T. K.; DuPont, H. L. (Univ. Texas Health Science Center, 6400 W. Cullen St., Houston, TX 77030). *JA* 236(23):2662-2664; 1976.

An algorithm for diagnosis in patients with acute diarrhea is presented. Patients who should be hospitalized include the very young or elderly with severe diarrhea and patients of any age with diarrhea and pronounced systemic toxemia, hyperpyrexia, or dehydration. When drug-associated diarrhea is suspected, the therapy should be discontinued and proctoscopy performed to see if a pseudomembran is present. Antimicrobial agents such as clindamyc and lincomycin hydrochloride monohydrate, in particular, may cause diarrhea. In food-borne illness, staphylococcal toxin-mediated illness is to be suspected if the symptoms occur 2-4 hr after ingestion and if vomiting is prevalent. If the onset is 12-1 hr after ingestion, *Clostridium perfringens* is the likely agent. If fecal WBC are present, infections by *Salmonella*, *Shigella*, *Yersinia*, and *Escherichia coli* are likely, producing diarrhea by causing colonic mucosal inflammation. If diarrhea lasts longer than 1 week, the stools should be examined for prot zoa. The common parasitic organisms include *Giardi lamblia*, *Entameba histolytica*, and occasionally, *Dientameba fragilis*. If the illness does not abate

thin 2 weeks, small bowel intubation with aspira-
on and biopsy may show *G. lamblia*.

91 CHOLESTYRAMINE IN TREATMENT OF POST-
VAGOTOMY DIARRHOEA--DOUBLE-BLIND CONTROLLED
IAL. (Eng.) Allan, J. G.; Russell, R. I. (Royal
firmary, Glasgow G4 OSF, Scotland). *Br. Med. J.*
6062):674-676; 1977.

e effectiveness of cholestyramine in treating
vere continuous postvagotomy diarrhea was eval-
ted in a double-blind, controlled trial, which
cluded 16 patients who had this symptom for at
ast 2 yr. Eight patients received 4 g of choles-
ramine three times daily, while the remaining pa-
ents received a placebo. Clinical assessments
the daily stool frequency, consistency, and
gree of urgency were made at 4 and 8 weeks of
eatment, and the patient's and clinician's
sessments of improvement were noted at these
mes. Although the numbers were too small for
atistical analysis, the patients treated with
olestyramine showed considerable improvement
er those given placebo. In the former group, all
t one patient believed that the drug had im-
oved the symptoms, and three thought that it had
mpletely relieved them; the assessments by
e doctor and patient correlated in all but one
tient who, nevertheless, had a reduction in stool
equency. Among the patients treated with place-
, only two patients thought that their symptoms
d improved, due to a decrease in urgency. Six
tients on cholestyramine and two patients on
acebo noted an improvement in stool consistency.
de-effects were noted in five patients on choles-
ramine (vomiting, 1; nausea, 3; lethargy, 1; heart-
rn, 1; abdominal cramp, 2), but none were serious.
t appears that cholestyramine may be of value in
e management of some patients with severe
ntinuous postvagotomy diarrhea who are unrespon-
ive to other forms of treatment.

592 NECROTIZING ENTEROCOLITIS AND HYPERVISCO-
SITY IN THE NEWBORN INFANT. (Eng.)
akanson, D. O.; Oh, W. (Women and Infants Hosp.
hode Island, 50 Maude St., Providence, RI 02908).
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1-yr prospective survey was undertaken to deter-
ine the incidence of whole blood hyperviscosity
HV) and necrotizing enterocolitis (NEC) in small-
or-gestational age (SGA) infants. Among 79 SGA
nfants, 14 had a blood viscosity that was 2 stand-
rd deviations or greater than the normal values;
hey were considered to have HV. Of these 14 in-
ants, 5 developed NEC, whereas only 1 of 65 SGA in-
ants with normal blood viscosity had NEC ($p<0.005$).
comparison of the clinical features of the five
V infants with NEC and the features of cases re-
orted in the literature showed that the latter
nfants had longer gestational periods (36-40 weeks
ersus $\leq$ 34 weeks) and higher birth weights (1,370-
,430 g versus $\leq$ 1,500 g). In contrast to those
eported in the literature, these infants were free
f clinical evidence of asphyxia or respiratory distress. The authors propose that HV may be another factor leading to ischemia in the gastrointestinal tract, with subsequent development of NEC.

2593 IMPORTANCE OF THE COLON IN ENTERIC HYPEROXALURIA. (Eng.) Dobbins, J. W.; Binder, H. J. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *N. Engl. J. Med.* 296(6):298-301; 1977.

To investigate the role of the colon in increased oxalate absorption, urinary oxalate and fecal fat excretion were measured in 26 patients with gastrointestinal diseases. Eight patients with intact colons and steatorrhea (caused by Crohn's disease, chronic pancreatitis, jejunoileal bypass, or extrahepatic biliary obstruction) had hyperoxaluria (>45 mg/24 hr). None of five patients with ileostomies and steatorrhea secondary to ileal resection had hyperoxaluria. ^{14}C-oxalate absorption was increased in three patients with steatorrhea and intact colons (>35% excretion), but not in three patients with steatorrhea and ileostomy (<10% excretion). The results indicate that the colon is the site of increased oxalate absorption in enteric hyperoxaluria and is required for this process. The lack of a direct relation between fecal fat excretion and urinary oxalate excretion in the patients with hyperoxaluria and steatorrhea suggests that steatorrhea is not the only determinant in the pathogenesis of hyperoxaluria.

2594 THE VIPoma: FURTHER CONFIRMATION OF VIP AS THE HORMONAL AGENT IN THE WDHA SYNDROME. (Eng.) Shield, C. F., III; Haff, R. C. (Wilford Hall U.S. Air Force Medical Center, Lackland Air Force Base, TX 78236). *Am. J. Surg.* 132(6):784-786; 1976.

The case of a patient with the watery diarrhea hypokalemia achlorhydria (WDHA) syndrome, in whom serum and tumor assays for gastrin, vasoactive intestinal peptide (VIP), and prostaglandins E and F were carried out, is presented. A 39-yr-old man presented with a 1-yr history of recurrent watery diarrhea and proximal muscle weakness. Gastric analysis demonstrated achlorhydria. Despite massive i.v. fluid and electrolyte replacements, at times requiring up to 340 mEq KCl/day, 15-18 l of i.v. fluid, and bowel rest, the diarrhea persisted. The patient also experienced an episode of hypokalemic uremia. At exploratory celiotomy, a 20-cm tumor was found in the tail of the pancreas. The patient underwent distal hemipancreatectomy with incontinuity splenectomy, midtransverse colectomy, and colocolostomy. In the immediate postoperative period, the symptoms resolved, and the patient has been completely asymptomatic with normal serum electrolytes during a 2-yr follow-up period. The pre- and postoperative serum VIP levels were 5,000 and 100 pg/ml, resp.; the respective values for gastrin and prostaglandins E and F were 80 and 76 pg/ml, 525 and 300 pg/ml, and 369 and 100 pg/ml. In the tumor, the VIP, prostaglandin E, and prostaglandin F levels were 1,000 pg/ml, 1.6 ng/g, and 0.5 ng/g, resp. A review of the literature concerning gastrin, secretin, glucagon, enteroglucagon, gastric inhibitory peptide (GIP), VIP, and prostaglandins as possible etiologic agents for the WDHA syndrome leads to several hypotheses. The reports of secretin, glucagon, and GIP as the etiologic agents could be secondary to contamination of these polypeptide preparations with VIP. Another possibility is antibody cross-reactivity due to the similar amino acid sequence of this group of peptides. Standardization of the VIP assay should result in increased recognition of this disease prior to the fulminant clinical presentation.

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GENERAL

Parasitology

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ospsy specimens of intestinal mucosa from two pa-
ents with malabsorption were examined by routine
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spected giardiasis. Both specimens showed intact
testinal mucosa, but electron microscopy revealed
ardia lamblia within the lumen and in the inter-
llous spaces. The parasites were typically not
tached to the intestinal mucosa and frequently were
en in a crescent form. The trophozoites were sub-
quently recognized in the histologic sections as
escent-shaped bodies or cellular debris. Elec-
on microscopy is useful for the identification of
is parasite, since stool examinations in up to
% of the cases may be negative.

2660 SURFACE ULTRASTRUCTURE OF GIARDIAL INFESTATION. (Eng.) Tubbs, R. R.; Hawk, W. A. (Cleveland Clinic Foundation, Cleveland, OH). *Cleve. Clin. Q.* 43(4):293-299; 1976.

The light microscopic and surface ultrastructural features in a patient with giardial infestation and malabsorption were studied, the the patient's case report is presented. The patient, a 58-yr-old man, presented with left upper quadrant pain, belching, abdominal distension, and a 2-yr history of diarrhea and weight loss. *Giardia lamblia* cysts were detected in both the stool and in a specimen obtained by duodenal aspiration; the patient's symptoms resolved with metronidazole treatment. Light microscopy revealed *Giardia* trophozoites within the duodenal lumen and in the crypts; electron microscopy confirmed this and showed trophozoites lying free on the luminal surface. Mild to absent shortening of the microvilli was observed.

2661 SURVEILLANCE OF SOME INFECTIOUS DISEASES AMONG AIRCREW PERSONNEL IN SOUTHEAST ASIA. (Eng.) Lee, R.; Cross, J. H.; Irving, G. S.; Lane, C.; Watten, R. H. (U.S. Naval Medical Res. Unit No. 2, Taipei, Taiwan). *Aviat. Space Environ. Med.* 48(9):1152-1154; 1975.

2662 DRUG AND IMMUNO-DIAGNOSTIC RESISTANCE AMOEBIC LIVER ABSCESS IN IBADAN: AN ELUCIDATION OF A POSSIBLE MECHANISM. (Eng.) Abioye, A. A. (Univ. Coll. Hosp., Ibadan, Nigeria). *J. Trop. Med. Hyg.* 79(11):252-255; 1976.

2663 VITAMIN A ABSORPTION IN ASCARIASIS. (Eng.) Mahalanabis, D.; Jalan, K. N.; Maitra, T. K.; Agarwal, S. K. (Calcutta Medical Res. Inst., 7/2, Diamond Harbour Rd., Calcutta 27, India). *Am. J. Clin. Nutr.* 29(12):1372-1375; 1976.

2664 GIARDIASIS: AN OVERVIEW FOR THE CLINICIAN. (Eng.) Raizman, R. E. (Lab. Parasitic Diseases, Natl. Inst. Health, Building 5, Room 114, Bethesda, MD 20014). *Am. J. Dig. Dis.* 21(12):1070-1074; 1976.

2665 A PUZZLING CASE OF GIARDIASIS. (Eng.) Paine, T. F., Jr.; Gluck, F. W. (Nashville Metropolitan General Hosp., 72 Hermitage Ave., Nashville, TN 37210). *JAMA* 236(21):2425-2426; 1976.

2666 KALA-AZAR IN ZAMBIA: FIRST REPORT OF TWO CASES. (Eng.) Naik, K. G.; Hira, P. R.; Bhagwandeen, S. B.; Egere, J. U. (Sch. Medicine, Univ. Zambia, Lusaka, Zambia). *Trans. R. Soc. Trop. Med. Hyg.* 70(4):328-332; 1976.

2667 TWO CASES OF ENTERIC MYIASIS IN MAN. PSEUDOMYIASIS AND TRUE INTESTINAL MYIASIS. (Eng.) Kenney, M.; Eveland, L. K.; Yermakov, V.; Kassouny, D. Y. (Kings County Hosp. Center, 451 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Clin. Pathol.* 66(5):786-791; 1976.

2668 PREVALENCE OF INTESTINAL PARASITIC INFESTATION, SALMONELLOSIS, BRUCELLOSIS, TUBERCULOSIS, AND HEPATITIS B AMONG IMMIGRANT CHILDREN IN GLASGOW. (Eng.) Goel, K. M.; Shanks, R. A.; McAllister, T. A.; Follett, E. A. C. (Royal Hosp. Sick Children, Yorkhill, Glasgow G3 8SJ, Scotland). *Br. Med. J.* 1(6062):676-679; 1977.

2669 BILHARZIAL GRANULOMA OF THE GASTRO-INTESTI TRACT. (Eng.) Elmasri, S. H.; Boulos, P. B. (Univ. Coll. Hosp. Medical Sch., London, England). *Br. J. Surg.* 63(11):887-890; 1976.

2670 CAN WE VACCINATE AGAINST SCHISTOSOMES? (Eng.) Hillyer, G. V. (Dept. Biology, Uni Puerto Rico, Rio Piedras, PR 00931). *Fed. Proc.* 35(14):2568-2571; 1976.

See also, 1827, 2212, 2250, 2312, 2402, 2649.

GENERAL

Regional Enteritis

2671 FERRITIN IN CROHN'S DISEASE TISSUE: DETECTION BY ELECTRON MICROSCOPY. (Eng.) Whorwell, P. J.; Baldwin, R. C.; Wright, R. (Southampton General Hosp., Southampton, SO9 4XY, England). *Gut* 17(9):696-699; 1976.

Attempts were made to visualize viral particles by electron microscopy in 12 specimens of Crohn's disease tissue and in stool preparations from nine patients with this disease. Four normal intestinal specimens and one small intestinal lymphoma were also studied. No viral particles were observed by either direct or immune electron microscopy in the tissue or the stool specimens. Abundant 12-nm particles of density 1.45 were found in all tissue specimens. Similar particles were found only occasionally in normal tissue. The particles were not clumped by Crohn's or normal sera. Negative stainin and electron microscopy of purified horse spleen ferritin revealed particles that were morphologicall identical to the 12-nm particles; in addition, radioimmunoassay demonstrated ferritin in those fractions of the gradient containing the particles, the levels showing a close correlation with the particle count. Since some diseased cells have an abnormally high rate of ferritin synthesis, the authors conclude that this is also the case in Crohn's disease.

2672 COLONIC PERFORATION IN CROHN'S DISEASE. (Eng.) Fisher, J.; Mantz, F.; Calkins, W. G. (1800 Sullivan Ave., Suite 304, Daly City, CA 94015). *Gastroenterology* 71(5):835-838; 1976.

The case reports of three patients with acute, free perforation of the colon in Crohn's disease are presented. The first patient, a 17-yr-old boy, had undergone an ileocolostomy for Crohn's disease 11 months previously; abdominal pain, diarrhea, and fever persisted postoperatively, in spite of management with corticosteroids, ACTH, and salicylazosulfapyridine. An emergency laparotomy revealed marked inflammation and omental adhesions at the previous anastomotic site between ileum and colon and a free colonic perforation just distal to the anastomosis. The perforation was closed, and the involved bowel was resected. The patient continues to have active inflammatory bowel disease 11 months after the reconstruction of the ileocolonic anastomosis, despite chemotherapy. The second patient, a 28-yr-old man, had a 4-yr history of Crohn's disease of the small and large bowel and had been maintained in remission on corticosteroids and salicylazosulfapyridine for two of those years. Severe abdominal pain led to an emergency laparotomy, which revealed inflammatory changes of the ileum and colon and a 5-mm free perforation in the sigmoid colon. A diverting colostomy was carried out, but a second operation was performed 22 days later because the patient developed multiple intra-abdominal abscesses. Two ileal perforations were found and closed, and a partial left colectomy was performed. The remaining colon was removed 4 weeks later, at which time no further perforations were found. Patient 3, a 64-yr-old man, had undergone an ileotransverse colostomy 15 yr previously for inflammatory bowel disease. One colonic perforation proximal to the splenic flexure and seven perforations in the mid descending colon were discovered at laparotomy following an episode of bloody diarrhea and abdominal pain. Pathologically, the perforations in this patient were thought to be due to exceedingly acute fulminating disease, with dissolution of the bowel wall at the base of relatively broad ulcers. This was the only patient with features suggesting toxic megacolon. In the first two patients, it appeared that the perforations resulted from indolent penetrating sinuses, which had not previously approached the serosal surface closely enough to incite the usual adhesive peritoneal inflammatory reaction.

2673 SERUM TRYPTOPHAN IN CROHN'S DISEASE. (Eng.) Beeken, W. L. (D-308 Given Building, Univ. Vermont, Burlington, VT 05401). *Scand. J. Gastroenterol.* 11(7):735-740; 1976.

2674 METASTATIC CROHN'S DISEASE. (Eng.) McCallum, D. I.; Gray, W. M. (Raigmore Hosp., Inverness, Scotland). *Br. J. Dermatol.* 95(5):551-554; 1976.

See also, 2311, 2325, 2381, 2406, 2408, 2593.

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2194
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2498*
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2056
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1807
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1985
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2464*
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2212
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1752*
PAINE, T.F., JR.
2665
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1931*
PALMER, E.D.
2615
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2113
PALOHEIMO, M.
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PALOSCHI, G.B.
2255
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2430*
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2177*
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2280*
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2113
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2524*
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2449*
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2577*
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2368
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2179*
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2509
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2524*
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2171*
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1987
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2480*
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2347*
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2536*
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1978*
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PFAFF, E.
1774*
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2116
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1946
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2177*
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2568*
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2092
PHELAN, J.J.
2354
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2254
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2351
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2171*
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2032
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2105*
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2175*
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2120
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2327
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2187
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2387
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2632
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1970*
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2111
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2551
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2478
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2255
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1838
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2003
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2369*
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2393
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2281*
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1786
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1794
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1843
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2159
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2315*
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2385
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2516
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1894
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2082
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1926*
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2155
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2552
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1993
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2379
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2494*
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2584
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2629
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2119
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2373
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2453*
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2357
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2541*
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2281*
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1825*
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2564
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1874*
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2179*
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1923
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1982
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2539*, 2540*
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1994
SALERNO, F.
2548
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1765
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2182
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2200
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2556
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2523*
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2451*
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1833*
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2103*
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1797
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2618
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2590*
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1775*
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2415*
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2132
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1820
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2529
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1993
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1802
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1768*
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2142
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2219
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1940
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1835
SCHANTZ, A.
2628
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1870
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2555
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1810
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2452*
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2544*
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2347*
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1859
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2496*
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SCHWARTZ, M.Z.
2455*
SCHWEITZER, I.L.
2492*
SCHWENK, M.
1774*
SCHWOB, D.
2500
SCOLNICK, M.E.
2210
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1977*
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2355
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2163
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1849
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1933
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1749*
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2158
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2283*
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2248
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1956
SELHUB, J.
1809
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2459*
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2157
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1975*

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1782
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1888
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2142
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2140
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2668
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2654
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SHATZ, B.A.
2410*
SHEARMAN, D.J.C.
1882*
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1994
SHEIKH, N.E.L.
2520
SHEIKHOLESLAMI, M.H.
2400
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1941
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2512, 2542*, 2556
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2594*
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1782
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2370*
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2444
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2489*
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1778*
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1974*
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2430*
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2363
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2049
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2213
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2286*, 2469, 2539*, 2540*
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2246
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2286*
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2217
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1755*
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2542*
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1767*
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1827*
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2397
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2116
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2301
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2450*
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1911
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2628
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2588*
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2408
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1871*, 1909
SPERLING, M.A.
2332
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2318
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2281*
SRIKANTAIAH, M.V.
1993
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2111
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STARLING, J.R.
2258
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2642
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2184
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1974*
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2543*
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2408
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2448*
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2461*
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2569*
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2176*
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2568*
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2139
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2270
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2444
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1976*
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1969*
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2060*
TAVILL, A.S.
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TAYLOR, A.E.
1773*
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2623
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1786
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2511
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2504
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GASTROENTEROLOGY

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AND
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National Institute of Arthritis, Metabolism, and Digestive Diseases

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tra Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
µg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
µM	micromolar; micromole(s)
ma	milliampere(s)
mCi, µCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, µl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

75 BIOCHEMICAL DIFFERENTIATION OF THE PLASMA
MEMBRANE OF THE INTESTINAL EPITHELIAL
LL. (Eng.) Michell, R. H.; Coleman, R.; Lewis,
A. (Dept. Biochemistry, Univ. Birmingham, P.O.
x 363, Birmingham B15 2TT, England). *Biochem.
c. Trans.* 4(6):1017-1020; 1976.

e biochemical differentiation of the plasma mem-
ane of enterocytes is reviewed. The study of
ush border preparations reveals a membrane with a
riety of terminal digestive hydrolases attached
its luminal surface; these hydrolases are heavily
ycosylated and are moored to the membrane by
latively small hydrophobic polypeptide segments.
the cytoplasmic surface of the brush border mem-
ane, and attached to it by α-actinin bridges, is
actin array that forms the microvillus core,
ich also interacts with myosin-like proteins in
e terminal web. It is possible that the brush
rder is motile and that its motility facilitates
s digestive and absorptive function. Enzyme stud-
s have indicated that the brush border and baso-
teral regions of the plasma membrane have distinct
mplements of enzymes. Analysis of the lipids of
e two plasma membrane regions of the guinea pig
terocyte has shown that the lipids of both regions
e rich in cholesterol, sphingolipids, and glycero-
ids.

76 LAMELLATED OSMIOPHILIC BODIES IN MOUSE
GALLBLADDER EPITHELIUM. (Eng.) Neval-
ien, T. J.; Dean, S.; Jokelainen, P. T.; Laitio,
(Lab. Electron Microscopy, Univ. Turku, Kiinamyl-
katu 10, 20520 Turku 52, Finland). *Acta Anat.
sel)* 96(4):486-496; 1976.

e ultrastructure of C57BL/10J mouse gallbladder
thelium was studied by electron microscopy, with
ecial attention to dense cytoplasmic bodies.
erogeneous dense bodies with osmiophilic and
se granular components were identified. Many of
se bodies consisted of lamellated osmiophilic
uctures, similar to the phospholipid bodies of
large alveolar (type II) cells of the mammalian
g. The dense bodies containing the lamellar
uctures were membrane-limited and 0.5-1.0 μm in
meter. They were located in the supranuclear
oplasm and were often closely associated with the
gi apparatus. Acid phosphatase activity was
onstrated within these bodies and in some of the
gi vacuoles. The contents were disposed in con-
tric lamellar osmiophilic structures, sometimes
earing as scroll-like configurations. These
dings suggest that phospholipid absorbed from
gallbladder lumen is stored in phagosomes in the
tral cytoplasm of the gallbladder epithelial cells.

7 MORPHOMETRIC ANALYSIS OF RAT HEPATOCYTES
AFTER TOTAL BILIARY OBSTRUCTION. (Eng.)
es, A. L.; Schmucker, D. L.; Mooney, J. S.;
er, R. D.; Ockner, R. K. (Veterans Admin. Hosp.,
4150 Clement St., San Francisco, CA 94121). *Gastroenterology* 71(6):1050-1060; 1976.

The effects of 48-hr extrahepatic biliary obstruction on hepatocyte structure were examined by light and electron microscopy in male Sprague-Dawley rats. Obstruction was produced by doubly ligating the common bile duct immediately distal to its origin and dividing it between the two ligatures. Liver cells near the portal area were compared with those in the centrilobular regions of the hepatic lobule. Observations in normal animals confirmed earlier evidence of quantitative differences in the surface density of organelles in hepatocytes from different regions of the lobule. The portal cells contained a significantly greater quantity of Golgi complex than centrilobular hepatocytes. After 48 hr of total obstruction, morphometric analysis revealed that the volume of Golgi in the portal hepatocytes was reduced to one-half that of control values. A similar decrease in the surface area of the Golgi membranes in the portal cells was observed in the cholestatic livers. After biliary obstruction, there was a marked decrease in the total amount of endoplasmic reticulum membrane in both the central and portal cells. In all zones, a decrease in the volume density of mitochondria and lysosomes was noted, whereas the volume of microbodies was increased. The loss in total membrane material within the cell may be secondary to the degranulation and decrease in total surface area of rough endoplasmic reticulum, an organelle thought to be responsible, in part, for the synthesis of new cellular membranes. These observations suggest that present concepts of the pathogenesis of cholestatic liver disease require reappraisal.

2678 DISTRIBUTION OF ORGANELLES AND MEMBRANES BETWEEN HEPATOCYTES AND NONHEPATOCYTES IN THE RAT LIVER PARENCHYMA: A STEREOLOGICAL STUDY. (Eng.) Blouin, A.; Bolender, R. P.; Weibel, E. R. (Faculty Veterinary Medicine, Univ. Montreal, Saint-Hyacinthe, Quebec, Canada). *J. Cell Biol.* 72(2):441-455; 1977.

A systematic stereological analysis of liver parenchyma was carried out to determine the distribution of organelles and membranes between hepatocytic and endothelial, Kupffer, and fat-storing cells (nonhepatocytes). Sprague-Dawley rat livers were fixed by vascular perfusion, and the data were corrected for systematic errors due to section thickness and compression. The extracellular space compartment included the lumina of sinusoids (10.6%), the space of Disse (4.9%), and the bile canaliculi (0.4%). Hepatocytes constituted 78% of parenchymal volume; the nonhepatocytes accounted for 6.3% and consisted of 2.8% endothelial cells, 2.1% Kupffer cells, and 1.4% fat-storing cells. The nonhepatocytes contributed 55% of the volume of lipid droplets in the liver, 43% of the lysosomes, and 1.2% of the mitochondria. Although the nonhepatocytes accounted for only 8% of the total surface area of parenchymal membranes, they contained 26.5% of all the plasma membranes, 32.4% of the lysosomal membranes, 15.1% of the Golgi apparatus, 6.4% of the endoplasmic reticulum, and 2.4% of the mitochondrial membranes. The data demonstrate the extent to which nonhepatocytic organelles can contaminate subcellular fractions used for biochemical studies. Particularly important for the interpretation of studies on lysosomes, plasma membrane, and Golgi apparatus is the finding that an appreciable part of these organelles may be derived from cell types other than hepatocytes.

2679 EXOCRINE PANCREAS UNDER EXPERIMENTAL CONDITIONS. III. MEMBRANE AND CELL JUNCTIONS IN ISOLATED ACINAR CELLS. (Eng.)

Metz, J.; Forssman, W. G.; Ito, S. (Anatomisches Institut III, Im Neuenheimer Feld 307, D-6900 Heidelberg, W. Germany). *Cell Tissue Res.* 177(4): 459-474; 1977.

The ultrastructure of the cell membrane and intercellular junctions was studied after the isolation of rat exocrine pancreatic cells by tryptic digestion and mechanical treatment. The number and distribution of membrane-associated particles did not change significantly when acinar cells *in situ* were compared to those after the isolation procedure. However, intercellular junctions underwent distinct alterations. Gap junctions in normal pancreatic cells were macular in shape and localized at the lateral parts of the cell membrane. In isolated acinar cells, gap junctions were irregularly shaped, more extended, and frequently associated with tight junctions. Tight junctions formed belt-like structures that persisted after isolation, but subsequently became elongated and interrupted. Thus, extensive macular areas of tight junctions developed. The strands on the P-face and the grooves on the E-face of freeze-fracture replicas changed in array, dissociated, and became loosely packed on large membrane areas. The intramembranous proteins of tight and gap junctions are mobile structures within the fluid membrane. The shape of their array is dependent on the form of the intercellular contact zone.

2680 SCANNING ELECTRON MICROSCOPY OF DISSOCIATED PANCREATIC ACINAR CELL SURFACES. (Eng.)

Motta, P.; Andrews, P. M.; Caramia, F.; Correr, S. (Istituto di Anatomia umana normale, Universita' di Roma, Viale Regina Elena, 289, I-00161 Rome, Italy). *Cell Tissue Res.* 176(4):493-504; 1977.

The pancreatic acinar cell surfaces of adult rats and Rhesus monkeys were studied by scanning electron microscopy (SEM) with a dissection technique and were correlated with results obtained by transmission electron microscopy (TEM). The SEM results demonstrated characteristic arrangement of microplicae, which in some areas were densely packed. In many areas, the microplicae were distributed in such a manner that they created zones with typical geometrical shapes and showed a relatively smooth surface. These smooth areas may coincide, with the limits of intimate contact between adjacent acinar cells, which, in turn represent part of the junctional complex. SEM preparations revealed the presence of groups of densel packed microplicae, arranged in regular rows and distributed along some grooves and/or infoldings of the cellular surface. On the basis of SEM and TEM information, it is likely that these structures correspond to intercellular (and possibly, in some cases, intracellular) canaliculi, which topographically form a kind of extensive microlabyrinthine arrangement runni along all the cell sides. Spherical zymogen droplets were found within the vesicles of the Golgi complex. Because these vesicles appeared to be connected by small openings, in many scanning images they may repre sent a system of intercommunicating chambers (vacuole through which the zymogen droplets can be continuousl accumulated and discharged into the acinar lumen.

2681 THE EFFECT OF FIXATION CONDITIONS ON THE ULTRASTRUCTURAL APPEARANCE OF GASTRIN CELL GRANULES IN THE RAT GASTRIC PYLORIC ANTRUM. (Eng.)

Mortensen, N. J. M.; Morris, J. F. (Medical Sch., University Walk, Bristol BS8 1TD, England). *Cell Tissue Res.* 176(2):251-263; 1977.

The ultrastructural appearance of gastrin cell (G cell) granules from Wistar rats was studied after different fixation procedures. When the pH of prefixation was varied, there was greater preservation of the electron density of granule cores after acidi (pH 5.0 and 6.0) than after neutral or alkaline (pH 7.0 and 8.0) prefixation. Increasing the duration o prefixation at pH 7.3 resulted in a progressive loss of electron density of the granule core, with swelling and occasional rupture of the limiting membrane In tissues where most granules had been rendered ele tron lucent by fixation, granules that remained dens cored were preferentially located close to the Golgi zone. These findings indicate that the electron der sity of G cell granules is profoundly affected by co ditions of fixation and that immature granules are more resistant to loss of core density than are matu granules. The gastrin granule *in vivo*, like other polypeptide granules, may have a "solid," osmoticall inactive core.

2682 ULTRASTRUCTURAL AND CARBOHYDRATE HISTOCHE ICAL STUDIES ON THE DIFFERENTIATION AND R NEWAL OF MUCOUS CELLS IN THE RAT GASTRIC FUNDUS.

(Eng.) Wattel, W.; Geuze, J. J.; de Rooij, D. G. (Center for Electron Microscopy, State Univ., Nicol Beetsstraat 22, Utrecht, Netherlands). *Cell Tissue Res.* 176(4):445-462; 1977.

The histochemistry and ultrastructure of Wistar rat gastric surface mucous cells (SMC) and mucous neck cells (MNC) and their undifferentiated and immature precursors were studied. The secretory granules o SMC were smaller, more electron dense, and more reactive to PAS and its analogues than those of MNC. Alcian blue staining demonstrated that the mucus o SMC was acidic and that of MNC was neutral. The p iodic acid-thiocarbohydrazide-silver proteinate method revealed the presence of carbohydrates in the Golgi apparatus, condensing vacuoles, secre-

ry granules, apical vesicles and tubules, and
ll coat. Maturation of SMC during their mi-
ation toward the free surface was reflected by an
crease of rough endoplasmic reticulum and microfila-
nts, and a decrease of microvilli and apical vesicles
d tubules. The secretory granules of older SMC were
ss acidic and possessed a proteinaceous core. Most
C were fully differentiated, but some immature MNC
ntaining only a few granules were found. Further-
re, undifferentiated cells and intermediates between
C and MNC were also observed. The presence of both
ansitional and intermediate forms indicates that
th SMC and MNC arise from the same population of
differentiated cells. Incorporation of [^{3}H]thymidine
vealed that undifferentiated cells, isthmic SMC,
C, and intermediate cells are proliferative. No
oliferative activity was found in foveolar SMC,
rietal, chief, fibrillovesicular, or endocrine
lls.

83 STEREOLOGICAL CHANGES IN RAT PARIETAL CELLS AFTER VAGOTOMY AND ANTRECTOMY. (Eng.)

lander, H. F. (Dept. Anatomy, Univ. Umea, Umea,
eden). *Gastroenterology* 71(6):1010-1018; 1976.

e quantitative aspects of parietal cell ultrastruc-
re were studied in 44 normal, vagotomized, and an-
ectomized male Sprague-Dawley rats. The animals
re divided into seven groups: normal fasted, normal
nfasted, 4 weeks after vagotomy, 10 weeks after
gotomy and pyloroplasty, 10 weeks after pyloroplasty,
weeks after antrectomy, and 10 weeks after antrec-
my. Stereological data were obtained from 30-40
rietal cells in each animal. In the normal nonfast-
rats, the parietal cells high up in the glands had
larger secretory surface density than those at deep-
levels of the mucosa. Neck parietal cells contain-
g a few mucous granules constituted about 10% of
e total number of parietal cells in the normal rats;
ey were most common in the midgland region. The
erage parietal cell volume in the normal fasted rats
s calculated to be 1,100 μ^3; the cells were signifi-
ntly smaller 10 weeks after vagotomy and pyloroplas-
and still smaller 10 weeks after antrectomy. In
is respect, the results after vagotomy and pyloro-
asty did not differ from those after pyloroplasty
one. The parietal cell density in the normal fasted
ts averaged 144 x 10^3 cells/mm^3; in the operated
ts (except for the 4-week vagotomized rats) the
lls were more numerous. The parietal cell volume
nsity was about equal in all groups of animals, ex-
pt for the 10-week antrectomized rats, where a signi-
cant reduction occurred. A thinner mucosa with more,
t smaller, parietal cells is a morphological alter-
ion which may help to explain the drop in acid-pro-
cing capacity after antrectomy.

84 IMMUNOCYTOCHEMICAL EVIDENCE FOR GLUCAGON-CONTAINING CELLS IN THE HUMAN STOMACH.

ng.) Barragan, L. M.; Rufener, C.; Srikant, C. B.;
bbs, R. E.; Shannon, W. A., Jr.; Baetens, D.;
ger, R. H. (Dept. Anatomy, Faculty Medicine, Sala-
nca, Spain). *Horm. Metab. Res.* 9(1):37-39; 1977.

Evidence for the existence of fundal glucagon-containing cells was sought by immunocytochemical techniques in stomachs obtained at autopsy from eight patients without gastric disease. The direct immunoperoxidase technique, using antiglucagon serum 30K, demonstrated glucagon-containing cells in only one of the eight gastric fundi. These cells were located between parietal cells on the basement membranes and did not appear to reach the lumenal surface of the oxyntic glands. In the two sections from this patient, one contained 9 and the other 16 such cells. The specimen from this patient had been taken only 2-3 hr after death, whereas the other specimens had been taken up to 4 hr after death. The patient was also pregnant. To study the effect of the postmortem interval on fundic glucagon, the glucagon content of canine fundus (in which glucagon-containing cells were previously identified) was studied immediately after death and after 4 hr at room temperature. There was a marked loss of glucagon immunoreactivity after 4 hr, which may explain the low glucagon content in the postmortem tissues of man.

2685 LESIONS OF EXPERIMENTALLY INDUCED COLIBACILLOSIS IN NEONATAL GNOTOBIOTIC PIGS: A SCANNING ELECTRON MICROSCOPIC STUDY.

(Eng.) Newman, L. E.; Trapp, A. L.; Waxler, G. L. (Dept. Large Animal Surgery and Medicine, Michigan State Univ., East Lansing, MI 48824). *Am. J. Vet. Res.* 38(3):297-305; 1977.

Scanning electron and light microscopy were used in studies of stomach, doudenum, cranial, and caudal portions of the jejunum, ileum, cecum, and spiral colon from 18 gnotobiotic pigs to determine if any characteristic changes occurred in or on the surface of the intestinal tract as a result of *Escherichia coli* infection. Five dogs were raised as controls and 13 received 1.6 x 10^6 colony-forming units of *E. coli* 0138:K81:NM p.o. at 6 days of age. Infiltration of WBC into the stomach mucosa was seen by light microscopy. Scanning electron microscopy revealed an irregular pattern of the mucosal surface of the stomach, formed by the gastric pits and the mucosal extensions on the individual rugae. Sections of the ileum from control and infected pigs contained collapsed cells around the extrusion zone at the tips of the villi. These collapsed cells were more numerous in infected pigs and appeared to have sloughed from the area of the extrusion zone, resulting in exposure of the lamina propria. Cecum and spiral colon were free of changes. Alterations of the mucosa of the intestinal tract of gnotobiotic pigs infected with *E. coli*, visualized by scanning electron microscopy, were considered to be too inconsistent to be of diagnostic significance.

2686 ULTRASTRUCTURAL ORGANIZATION OF THE ENTEROCHROMAFFIN CELLS OF THE DUODENAL MUCOUS MEMBRANE AFTER VAGOTOMY.

(Rus.) Eletsky, Iu. K.; Starkova, E. S. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 82 (9):1131-1133; 1976.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

2687 ULTRASTRUCTURE OF THE DUODENAL MUCOSA IN RATS UNDER STRESS. (Rus.) Perov, Iu. L.; Evdokimov, V. V. (Fourth Main Administrative Board, USSR Ministry Public Health, USSR). *Biull. Eksp. Biol. Med.* 81(5):625-628; 1976.

2688 MORPHOLOGY OF THE JEJUNAL MUCOSA AFTER BILATERAL SUBDIAPHRAGMATIC VAGOTOMY. (Rus.) Tsibulevsky, A. Iu.; Eletsky, Iu. K. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 81(5):628-632; 1976.

2689 AN ELECTRON MICROSCOPIC STUDY OF PIG LIVER VIABILITY AFTER EXTRACORPOREAL STORAGE. (Eng.) Searle, R. F.; Flaks, B. (Medical Sch., Univ. Bristol, Bristol, England). *Br. J. Exp. Pathol.* 57(5):515-520; 1976.

2690 THE MICROCIRCULATORY ACINAR CONCEPT OF NORMAL AND PATHOLOGICAL HEPATIC STRUCTURE. (Eng.) Rappaport, A. M. (Univ. Toronto, Medical Sciences Building, Toronto, Ontario, Canada, M5S 1A8). *Beitr. Pathol.* 157(3):215-243; 1976.

2691 MITOCHONDRIAL MORPHOLOGY AND METABOLISM IN EXTRAHEPATIC OBSTRUCTION. (Ger.) van Husen, N.; Gerlach, U.; Roessner, A.; Uchida, Y (Medizinische Universitatsklinik, Westring 3, D-440 Munster, W. Germany). *Klin. Wochenschr.* 54(22):110 1108; 1976.

2692 THE IMPORTANCE OF SMOOTH MUSCLE CELLS IN THE DEVELOPMENT OF FOAM CELLS IN THE GASTRIC MUCOSA: AN ELECTRON MICROSCOPIC STUDY. (Eng.) Boger, A.; Hort, W. (Pathologisches Institu der Universitat Marburg a.d. Lahn, Robert-Koch-Str. 5, D-3550 Marburg a.d. Lahn 1, W. Germany). *Virch Arch.* [*Pathol. Anat.*] 372(4):287-297; 1977.

2693 HYPERGASTRINEMIA AND GASTRIN CELL HYPERPLASIA IN VARIOUS EXPERIMENTAL MODELS [Abstract]. (Eng.) Liedberg, G.; Hakanson, R.; Oscarson, J.; Rehfeld, J.; Stadil, F.; Sundler, F. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):43; 1976.

See also, 2698, 2742, 2801, 2816, 2835, 2862, 2880
2891, 2990, 3000, 3005, 3012, 3032, 3110
3273, 3378, 3514.

ABSORPTION - EXCRETION - TRANSPORT

2694 ELECTRICAL PROPERTIES AND ACTIVE SOLUTE TRANSPORT IN RAT SMALL INTESTINE. I. POTENTIAL PROFILE CHANGES ASSOCIATED WITH SUGAR AND AMINO ACID TRANSPORTS. (Eng.) Okada, Y.; Tsuchiya, W.; Irimajiri, A.; Inouye, A. (Kyoto Univ. Sch. Medicine, Kyoto 606, Japan). *J. Membr. Biol.* 31(3):205-219; 1977.

The transepithelial potential difference (PD_t) and the mucosal membrane potential (V_m) were measured in preparations of rat duodenum, jejunum, or ileum. When D-glucose (20 mM) was added to the mucosal fluid, there was a significant depolarization of the V_m and an increase in PD_t. L-glucose did not affect these parameters. Glycine (20 mM) applied to the mucosal side induced V_m depolarization and PD_t increment in ileal sheets only. When ouabain (3×10^{-4} M) was added to the serosal fluid or when phlorizin (10^{-4} M) was added to the mucosal fluid, the glucose dependent changes in PD_t and V_m were inhibited. After analyzing the results with an equivalent circuit model for the epithelium, it was concluded that the active transport of glucose and glycine involves both a depolarization of the mucosal membrane and a hyperpolarization of the serosal membrane. The latter was attributed to the activation of the serosal electrogenic sodium pump by Na^+ cotransported into the cell.

2695 ELECTRICAL PROPERTIES AND ACTIVE SOLUTE TRANSPORT IN RAT SMALL INTESTINE. II. CONDUCTIVE PROPERTIES OF TRANSEPITHELIAL ROUTES. (Eng.) Okada, Y.; Irimajiri, A.; Inouye, A. (Kyoto Univ. Sch. Medicine, Kyoto 606, Japan). *J Membr. Biol.* 31(3):221-232; 1977.

The transepithelial resistance (R_t), cell membran resistance (r_M), and ratio of serosal (r_s) to muc (r_m) cell membrane resistances were measured in r small intestine using lucite chambers and microel trodes. The addition of D-glucose (20 mM) or gly (20 mM) to the mucosal fluid did not affect the v obtained. An equivalent circuit analysis was use estimate the quantitative contribution of the ext cellular shunt pathway to the total transepitheli conductance. This estimated value of ≈95% was in accord with values obtained for other "leaky" epithelia and remained unaffected by the active transport of D-glucose or glycine. These results support the conclusion that the electric potential changes associated with active transport can be ascribed solely to changes in membrane electric charge: a depolarization of the mucosal membrane and a hyperpolarization of the serosal membrane.

6 EFFECT OF AMILORIDE ON ELECTRICAL ACTIVITY AND ELECTROLYTE TRANSPORT IN HUMAN COLON.
g.) Rask-Madsen, J.; Hjelt K. (Herlev Hosp.,
2730 Copenhagen/Herlev, Denmark). *Scand. J. Gas-*
enterol. 12(1):1-6; 1977.

tologically normal colon sections from 10 patients
e studied *in vitro* to determine whether ions other
n Na$^+$ are involved in generating an electrical po-
tial difference (PD) across the human colonic wall.
control preparations, the short circuit current
$_c$) was 2.9 μEq/hr/cm^2, while the net transfer of
and Cl$^-$ was 4.6 and 1.4 μEq/hr/cm^2, resp., and the
idual ionic flux was near zero. When 10^{-3} M ami-
ide was added to the mucosal side of the membrane,
I_{sc} decreased to 0.7 μEq/hr/cm^2, and the net Na$^+$
nsfer dropped to 3.4 μEq/hr/cm^2. The Cl$^-$ flow in
h directions was unchanged, while the residual
ic flux increased significantly. Rectal instil-
ion of 10^{-3} M amiloride in 13 normal subjects
sed a drop in PD from -46 mV to -27 mV, with a half
e of less than 13 sec. It is proposed that the
n counter ions for active Na$^+$ transport may be H$^+$
m mucosa to serosa and/or HCO$_3^-$ from serosa to mu-
a.

7 EFFECT OF PEPSIN ON IONIC PERMEABILITY OF CANINE ESOPHAGEAL MUCOSA. (Eng.) Safaie-
:azi, S. (Univ. Iowa Coll. Medicine, Iowa City,
52242). *J. Surg. Res.* 22(1):5-8; 1977.

pathogenesis of peptic esophagitis produced by
sin was clarified in a study of the effect of
sin on the permeability of canine esophageal muco-
The mean rate of hydrogen ion loss across the
osa of distally occluded esophagus perfused with
nEq/l HCl (-0.12 ± 0.02 mEq/30 min) or 100 mEq/l
(-0.49 ± 0.16 mEq/min) was increased to -0.30 ±
mEq/l when 7,500 U of pepsin was added to the
er HCl concentration; the addition of 15,000 U of
sin to this concentration increased the H$^+$ loss
0.23 ± 0.11 mEq/l. At 50 mEq/l HCl and 7,500 U
epsin, the H$^+$ loss was -0.92 ± 0.09 mEq/l (p<
2), but when the concentration of pepsin was in-
ased to 15,000 U, the H$^+$ loss was decreased to -0.65
04 mEq/l ($p<0.01$). The loss of H$^+$ was increased
.17 ± 0.17 mEq/30 min ($p<0.001$) when 7,500 U
epsin were added to 100 mEq/l HCl, but a decline
he amount of H$^+$ loss was noted when the concen-
ion of pepsin was increased to 15,000 U ($p<0.01$).
sin disrupts the esophageal mucosal barrier, and
observation suggests that reflux esophagitis in
s of incompetent gastroesophageal sphincter may
ue to increased permeability of the mucosa to H$^+$
ced by pepsin.

SEQUENTIAL UPTAKE OF HORSERADISH PEROXIDASE BY LYMPHOID FOLLICLE EPITHELIUM OF
R'S PATCHES IN THE NORMAL UNOBSTRUCTED MOUSE IN-
INE: AN ULTRASTRUCTURAL STUDY. (Eng.) Owen, R.
Veterans Admin. Hosp., [151E], 4150 Clement
San Francisco, CA 94121). *Gastroenterology*
):440-451; 1977.

eradish peroxidase (HRP) was injected into the
gated intestines of fasted healthy 2-month-old
e Swiss mice to determine whether it would be ab-
ed in detectable quantities by membranous epithelial cells of the lymphoid follicle epithelium of Peyer's patches (M cells), and whether subsequent uptake of HRP by lymphocytes could be documented. At 1- to 60-min intervals, the most distal ileal Peyer's patch was fixed, removed, reacted with H_2O_2-3,3'-diaminobenzidine, and examined by light and electron microscopy for HRP reaction product. At 1 min, HRP adhered to surfaces of columnar cells and M cells and extended down into surface pits in the M cell. After 5 min, HRP was found in vesicles of M cells, but not in columnar cells. At 1 hr, HRP was detected in the extracellular space between M cells and their enfolded lymphocytes, as well as in vesicles within these lymphocytes. Transport of intestinal luminal material by M cells, with subsequent uptake by lymphocytes, provides a specific route for antigen uptake into the intestinal lymphoid system.

2699 THE EFFECTS OF HYPOTHYROIDISM AND FASTING ON ELECTROGENIC AMINO ACID TRANSFER: POSSIBLE EVIDENCE FOR MULTIPLE NEUTRAL AMINO ACID CARRIER SYSTEMS IN RAT JEJUNUM. (Eng.) Syme, G.; Levin, R. J. (Dept. Physiology, The Univ., Sheffield, S10 2TN Yorkshire, England). *Biochim. Biophys. Acta* 464(3):620-628; 1977.

Everted jejunal sacs were prepared in fed or fasted hypothyroid male Sheffield rats, and membrane potential differences were measured when neutral amino acids were added to the mucosal fluid. The maximum potential generated (PD_{max}) and the K_m were compared to normal values from fed euthyroid rats. Valine transfer in fed hypothyroid rats induced an increase in the PD_{max} of 61%, but the K_m was unaffected, as compared to controls; the opposite was true for alanine, where the K_m was reduced by 24% and the PD_{max} was unaffected. Sarcosine reduced both these parameters. In fasted hypothyroid rats, valine and sarcosine reduced the K_m, while the PD_{max} was unaffected. Alanine caused a small increase in the PD_{max} and an unaltered K_m. Only alanine transfer was affected in fasted euthyroid rats, with both the PD_{max} and the K_m being reduced by 30% and 53%, resp. Values for leucine and methionine were not affected by fasting and/or hypothyroidism. These results seem to indicate the presence of at least three separate transfer mechanisms for neutral amino acids and one for sarcosine.

2700 SIGNIFICANCE OF Ca-SOAP FORMATION FOR CALCIUM ABSORPTION IN THE RAT. (Eng.) Gacs, G.; Barltrop, D. (St. Mary's Hosp. Medical Sch., London, W2 1PG, England). *Gut* 18(1):64-68; 1977.

The significance of calcium soap formation in the inhibition of calcium absorption was studied in rats. ^{47}Ca-labeled soaps of fatty acids were introduced into the duodenum, and the absorption of calcium was measured after 4 hr in a whole-body counter. The absorption of calcium was inversely correlated with the chain length of the fatty acid, varying from 1% for Ca-stearate to 60% for Ca-hexanoate. Increasing the degree of unsaturation of the fatty acid was accompanied by increased calcium absorption. The availability of calcium for absorption from the soaps was correlated with their solubility in 1% aqueous Na-tauroglycocholate. The percentages of calcium as soap in the small intestine and the feces after intragastric administration of calcium and fats were similar, suggesting that the fecal content of calcium soaps is an index of intestinal soap formation. Soap formation was negligible when $CaCl_2$ was given with tristearate, trioleate, or tridecanoate, and no depression of calcium absorption was observed; soap formation was marked (47.7 ± 16.6% in feces, 69.2 ± 16.0% in intestine) with stearic acid. Calcium absorption was markedly impaired by the addition of phosphates at a Ca:P ratio of 1:1, irrespective of the presence of neutral fats. Calcium absorption was reduced with stearic acid. The degree of Ca-soap formation and the inhibition of calcium absorption were well correlated. The results suggest that, although calcium soap formation may markedly depress calcium absorption in the rat, no significant soap formation takes place when fats are given in the form of triglycerides.

2701 INTESTINAL MITOCHONDRIAL CALCIUM UPTAKE DURING ADAPTATION TO DIETARY CALCIUM RESTRICTION. (Eng.) Krawitt, E. L.; Kunin, A. S.; Bacon, B. F. (Dept. Medicine, Univ. Vermont, Burlington, VT 05401). *Calcif. Tissue Res.* 21(2):129-133; 1976.

To evaluate the role of mitochondrial calcium uptake in intestinal calcium absorption, the effect of adaptation to dietary calcium deficiency on the *in vitro* uptake of calcium by duodenal mitochondria isolated from cockerels was studied. The birds used had received a diet adequate in vitamin D_3 and phosphate and 1.0% Ca for the first 9 days of life. For the next 8 days, the chicks received a diet containing 1.20% Ca, and for 10 days after that, they received either 1.20% or 0.08% Ca in the diet. The uptake of ^{45}Ca by mitochondria isolated from chicks deprived of dietary calcium was not significantly different from that of controls ($p>0.05$) at any time interval (0.5-20 min). The results suggest that increased calcium uptake by intestinal mitochondria is not crucial for adaptation to a low calcium diet.

2702 STUDY OF THE EFFECTS OF A CARBOHYDRATE AND A PHOSPHATE ON THE ABSORPTION OF CALCIUM IN INTESTINAL LOOPS IN SITU. (Fre.) Dupuis, Y.; Fournier, A.; Fournier, P. (Physiologie, Faculte de Pharmacie, 92290 Chatenay-Malabry, France). *C. R. Soc. Biol. (Paris)* 170(2):304-309; 1976.

The effects of L-xylose and sodium phosphate on the absorption of calcium chloride were examined in the ligated jejunum and ileal loops of rats *in vivo*. Isolated jejunal loops were injected with ^{45}Ca-labeled $CaCl_2$ to which graded doses of sodium phosphate (5, 10, 20, and 50 mM) had been added. The rats were sacrificed 3 hr after injection. The absorption coefficient of $CaCl_2$ fell from 49.4 ± 1.9% in the control animals to 36.3 ± 1.8, 29.1 ± 1.3, 19.0 ± 1.3, and 14.9 ± 1.4% with increased doses of sodium phosphate. In another series, L-xylose (10, 30, 70, and 150 mM) was injected into the ileum of young rats in a 20 mM $CaCl_2$ solution. The control absorption coefficient of $CaCl_2$ (24.8 ± 3.6%) was enhanced by increased doses of L-xylose to 70.8 ± 5.3% at a 150 mM dose. The calcium absorption curves were dependent on the dose of phosphate or carbohydrate and were simi
to those that account for the effect of activators
inhibitors on enzyme activity. The mechanisms of t
xylose activation and the phosphate inhibition of c
cium absorption have yet to be determined.

2703 SITE OF IRON ABSORPTION AS DETERMINED BY DIRECT INTESTINAL ^{59}Fe DOSING OF INTACT RATS. (Eng.) Ansari, M. S.; Miller, W. J.; Neathery, M. W.; Lassiter, J. W.; Gentry, R. P. (Dept. Animal and Dairy Science, Univ. Georgia, Athens, GA 30602). *Nutr. Rep. Int.* 15(1):37-40; 1977.

The iron absorption site(s) in the small intestine
of intact rats was studied under normal physiologi
conditions. $^{59}FeCl_3$ (20 μCi) was injected directly
into the small intestines of 46 Sprague-Dawley rats. Iron absorption was determined by comparing ^{59}Fe retention of the liver, kidneys, muscle, heart, tibia, spleen, blood, and whole-body carcass (with the intestinal tract removed) at 24 hr after dosing. Tissue ^{59}Fe was plotted against the site of injection expressed as a percentage of small intestinal length from proximal to distal end. A curvilinear relationship existed between tissue ^{59}Fe and dosing site, with about 90% of the dose being absorbed in the proximal 20% of the small intestine. The results demonstrate that the duodenum is the primary iron absorption site in rats.

2704 EFFECT OF IRON SATURATION OF TRANSFERRI
ON HEPATIC IRON UPTAKE: AN IN VITRO ST
(Eng.) Zimelman, A. P.; Zimmerman, H. J.; McLean
R.; Weintraub, L. R. (Veterans Admin. Hosp., 150
South Huntington Ave., Boston, MA 02130). *Gastro-enterology* 72(1):129-131; 1977.

The effect of percentage of transferrin saturatio
and total iron concentration on the rate of iron
uptake was studied in perfused rat livers. After
45 min, there was no significant difference in i
uptake by livers perfused with 46% or 78% iron-
saturated transferrin, with the total iron conte
kept constant at 13.8 ± 1.2 μg. However, raising
the concentration of iron from 7.0 to 14.6 μg in
the perfusate while maintaining a constant satur
tion of transferrin (47.0 ± 4%) increased the ir
uptake by 66% ($p<0.001$). At similar concentrati
of iron and transferrin saturation, iron-deficie
livers took up greater amounts of iron than did
normal livers; the uptake with a constant iron
concentration or with a constant transferrin concentration in the perfusate was twice that in th
normal liver. The results show that the hepatic
uptake of transferrin-bound iron is determined b
the concentration of iron in the perfusate and b
the status of iron stores in the liver being perfused.

2705 GASTROINTESTINAL ABSORPTION OF ^{95}Nb BY
OF DIFFERENT AGES. (Eng.) Mraz, F. R
Eisele, G. R. (Comparative Animal Res. Lab., 129

ethel Valley Rd., Oak Ridge, TN 37830). *Radiat. es.* 69(3):591-593; 1977.

he gastrointestinal absorption of ^{95}Nb was compared n juvenile and adult rats, and its duration in the igestive tract was determined. Carrier-free ^{95}Nb n oxalic acid was administered via gavage to rats 6 r-129 days of age, and these were sacrificed 4 days ater. Rats less than 6 hr old were dosed in the ame manner and sacrificed 1, 4, 5, 7, 9, 12, 15, 17, 9, or 21 days later. Significantly more ^{95}Nb was ound in the gastrointestinal tracts and the tissues f the 6-hr-old rats (47.5% and 5.54%, resp.) and the -day-old rats (21.8% and 3.86%, resp.) than in the astrointestinal tracts and tissues of the 21-day-old 0.015% and 0.088%, resp.) and 129-day-old rats 0.007% and 0.091%, resp.). In the pups dosed before he age of 6 hr, the greatest body content was found at days after dosing (6.6%) and was significantly highr than that found during the first 5 days after adinistration. The amount of ^{95}Nb in the gastrointesinal tract with its contents, however, decreased proressively from about 62% of the dose at day 1 to bout 20% at 9 days. At 15 days, the amount in the ody was significantly lower (4.6%, $p<0.01$) than at 9 r 12 days, while the gastrointestinal ^{95}Nb values ontinued to decline. The relatively high absorption f ^{95}Nb by the suckling pup and the long residence ime in the gastrointestinal tract indicates that ^{95}Nb s more hazardous in the juvenile than in the adult.

706 THIAMINE TRANSPORT BY HUMAN INTESTINE IN VITRO. (Eng.) Rindi, G.; Ferrari, G. Inst. Human Physiology, Univ. Pavia, via Forlanini , I-27100 Pavia, Italy). *Experientia* 33(2):211-13; 1977.

hiamine transport was studied in human gastroinestinal mucosa (stomach, small intestine, and ransverse colon) and muscle incubated *in vitro* with 2-^{14}C]thiamine-thiazole. At the start of incubaion, unlabeled (endogenous) free thiamine content anged from 0.40 to 0.21 nmol/ml tissue water in the ucosa and from 0.13 to 0.17 nmol/ml in muscle. hereafter, thiamine uptake increased against a conentration gradient in mucosa and decreased in smooth uscle. Only the small intestine, particularly the jeunum, had the ability to accumulate labeled thiamine uring the incubation. Thiamine was accumulated in he phosphorylated form. The results demonstrate the resence of an active thiamine transport mechnism in the human small intestine.

707 THE INTESTINAL MUCOSAL BARRIER TO INTACT ANTIGENIC PROTEIN: DIFFERENCE BETWEEN OLON AND SMALL INTESTINE. (Eng.) Warshaw, A. L.; ellini, C. A.; Walker, W. A. (Massachusetts Generl Hosp., Boston, MA 02114). *Am. J. Surg.* 133(1): 5-58; 1977.

he absorption of intact bovine serum albumin (BSA), nown to be orally antigenic in rats, was measured nd compared in the colon and small intestine of oltzman rats. ^{3}H-BSA (50 mg/kg) was infused into ither the duodenum or ascending colon, and a samle of mixed peripheral blood was obtained 3 hr later. Albumin absorption from the small bowel in 10 rats averaged 1.7% of the total infused. Colonic absorption, measured in eight rats, was 0.13% of the infused dose, which was significantly less ($p<0.001$) than in the small intestine. These studies support the possibility that uptake of ingested or bacterial antigens from the normal gut may be involved in the pathogenesis of local intestinal and systemic disease in man. This study, in demonstrating that colonic mucosal barrier, as well as that of the small intestine, is normally permeable to protein, provides a basis for considerations of the pathogenicity of proteins that originate in the colonic lumen.

2708 IN VITRO STUDIES OF INTESTINAL ENDOTOXIN ABSORPTION. I. KINETICS OF ABSORPTION IN THE ISOLATED EVERTED GUT SAC. (Eng.) Nolan, J. P.; Hare, D. K.; McDevitt, J. J.; Ali, M. V. (Buffalo General Hosp., 100 High St., Buffalo, NY 14203). *Gastroenterology* 72(3):434-439; 1977.

The mucosal to serosal unidirectional flux of endotoxin was measured quantitatively with the use of an *in vitro* rat gut sac preparation. ^{51}Cr-labeled endotoxin (0.05-2.0 mg/ml) was placed in the mucosal bath. Over a 2-hr period, a small amount of endotoxin was transported transmurally, which was shown chromatographically to be similar to the starting material and which retained its toxic and immunogenic properties. The presence of 2.0 mg/ml of endotoxin in the mucosal bath did not significantly alter the tissue histology or permeability to 3-*O*-methyl-D-glucose. When unidirectional fluxes were measured, the flux was not proportional to the endotoxin concentration, as would be expected with a passively permeable solute, but rather its transport system became "saturated," displaying a maximum transport rate of 4.72 μg/cm/2 hr and a K_m of 0.425 mg/ml. The isolated gut sac provides an excellent model for the precise study of factors involved in endotoxin absorption.

2709 CHOLINE INFLUX ACROSS THE BRUSH BORDER OF GUINEA PIG JEJUNUM. (Eng.) Kuczler, F. J.; Nahrwold, D. L.; Rose, R. C. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Biochem. Biophys. Acta* 465:131-137; 1977.

Choline uptake across the mucosal border of guinea pig jejunum was measured to determine the characteristics of this step in intestinal absorption. Unidirectional influx of ^{14}C-choline appeared to proceed primarily by a saturable, carrier-mediated process at low mucosal choline concentrations; at high concentrations (>4 mM) the influx rate is approximately linearly related to the mucosal choline concentration, suggesting that absorption by passive diffusion predominates. Influx was only minimally reduced by elimination of Na^+ from the mucosal test solution or by reduction of the intracellular Na^+ concentration. Preincubation of tissue samples with metabolic inhibitors (2,4-dinitrophenol, 0.1 mM; cyanide, 2.0 mM) or with ouabain (0.1 mM) did not markedly reduce influx. These results are consistent with a model of choline transport across the brush border membrane by a carrier-mediated mechanism similar to that involved in fructose absorption, but different from the Na^+-dependent mechanism participating in active transport of sugars and amino acids. At low lumenal choline concentrations, influx into colonic mucosa is slower than in jejunum and appears to be attributed solely to simple diffusion.

2710 COMPARISON OF IN VITRO TECHNIQUES USED FOR THE DERIVATION OF THE KINETIC CONSTANTS OF ACTIVE AND PASSIVE TRANSPORT IN RABBIT JEJUNUM [Abstract]. (Eng.) Thomson, A. B. R.; Dietschy, J. M. (Dept. Medicine, Univ. Alberta, Edmonton, Canada). *Clin. Res.* 25(1):19A; 1977.

2711 ASYMMETRICAL BEHAVIOR OF SMALL INTESTINE EPITHELIA UNDER OSMOTIC PRESSURE. (Rus.) Melikjants, A. G.; Malenkov, A. G. (Inst. Biological Testing of Chemical Compounds, Kupavna, Moscow region, USSR). *Biofizika* 21(3):500-503; 1976.

2712 THEORETICAL AND EXPERIMENTAL EFFECT OF THE UNSTIRRED WATER LAYER ON THE PASSIVE PERMEABILITY OF THE PROXIMAL AND DISTAL INTESTINE OF THE RABBIT [Abstract]. (Eng.) Thomson, A. B. R.; Dietschy, J. M. (Div. Gastroenterology, Univ. Alberta, Edmonton, Canada). *Clin. Res.* 25(1):19A; 1977.

2713 THE EFFECT OF pH AND BILE ON GASTRIC MUCOSAL PERMEABILITY [Abstract]. (Eng.) Newman, B. M.; Elder, J. B.; Merali, N. R.; Gillespie, I. E. (Royal Infirmary, Manchester, England). *Eur. Surg. Res.* 8(Suppl. 1):41-42; 1976.

2714 EFFECT OF MICROENCAPSULATION ON COMPETITIVE ADSORPTION IN INTESTINAL FLUIDS. (Eng.) Goldenhersh, K. K.; Huang, W. D.; Mason, N. S.; Sparks, R. E. (Dept. Chemical Engineering, Washington Univ., St. Louis, MO 63130). *Kidney Int.* 10(Suppl. 7):S251-S253; 1976.

2715 EFFECTS AND SIDE-EFFECTS OF DRUGS ON THE DIGESTIVE AND RESORPTIVE FUNCTION OF THE SMALL INTESTINE. (Ger.) Caspary, W. F. (Abteilung Gastroenterologie und Stoffwechselerkrankungen, Medizinische Universitatsklinik, Gottingen, W. Germany). *Dtsch. Med. Wochenschr.* 102(5):167-173; 1977.

2716 DRUG ABSORPTION FROM THE SMALL INTESTINE OF THE TRIPARANOL-TREATED RAT IN SITU. (Eng.) Venho, V. M. K. (Dept. Pharmacology, Univ. Helsinki, Siltavuorenpenger 10, SF-00170 Helsinki 17, Finland). *Acta Pharmacol. Toxicol.* 39(3):321-330; 1976.

2717 TRANSPORT-STUDIES IN SMALL BOWEL OBSTRUCTION IN THE RAT [Abstract]. (Eng.) Merkle, P.; Bindewald, H.; Betzler, M.; Herfarth, C. (Dept. Chirurgie, Universitat Ulm, D-79 Ulm, Donau, Steinhovelstr. 9, W. Germany). *Eur. Surg. Res.* 8(Suppl. 2):223-224; 1976.

2718 THE LIVER SINUSOID BARRIER DURING LOW FLO ITS CORRECTION BY HYALURONIDASE [Abstract (Eng.) Koven, I. H.; Pritzker, K.; Lo, S. F. (Univ Toronto, 600 University Ave., Toronto, Canada M5G 1X5). *Eur. Surg. Res.* 8(Suppl. 1):86-87; 1976.

2719 UPTAKE OF ALUMINIUM ION BY THE LIVER. (Eng.) Kushelevsky, A.; Yagil, R.; Alfas Z.; Berlyne, G. M. (Soroka Medical Center, Ben-Gurion Univ. of the Negev, P.O. Box 2053, Beer Sheb 84120, Israel). *Biomedicine* 25(2):59-60; 1976.

2720 TISSUE ACCUMULATION OF BILE SALTS (BS) DURING INTESTINAL TRANSPORT AT LOW BS CONCENTRATION [Abstract]. (Eng.) Ostrower, V. S.; Davis, J. V.; Ziegler, D. (Audie Murphy Veterans Admin. Hosp., San Antonio, TX). *Clin. Res.* 25(1):18A; 1977.

2721 INTESTINAL BILE SALT (BS) TRANSPORT AT LOW CONCENTRATIONS: EFFECT OF PHENOBARB TAL (PB) [Abstract]. (Eng.) Ostrower, V. S.; Davis, J. V.; Ziegler, D. (Audie Murphy Veterans Admin. Hosp., San Antonio, TX). *Clin. Res.* 25(1):18A; 1977.

2722 THE EFFECT OF LACTOSE ON PHOSPHATE AND CALCIUM TRANSPORT IN THE GUT, STIMULATIO OR INHIBITION [Abstract]? (Eng.) Lorenc, R. S.; Poniatowski, L.; Kruszewska, M.; Jelonek, A. (Medi Center, Warsaw, Poland). *Eur. J. Clin. Invest.* 6(4):330; 1976.

2723 CALCIUM TRANSPORT IN THE LARGE BOWEL OF DIETARY CALCIUM (Ca) RESTRICTED RATS [Abstract]. (Eng.) Urban, E.; Smith, N. L.; Smit T. C. (Audie Murphy Veterans Admin. Hosp., San Antonio, TX). *Clin. Res.* 25(1):51A; 1977.

2724 METHODS FOR MEASURING THE INTESTINAL ABSORPTION OF CALCIUM IN HUMANS. (Ger.) Gennari, C. (Istituto di Patologia Speciale Medic e Metodologia Clinica, Cattedra di Medicina Nucle Universita di Siena, Italy). *Munch. Med. Wochens* 118(52/53):1709-1712; 1976.

2725 DIGESTION AND ABSORPTION RATES FOR LACT SACCHAROSE, GLUCOSE, GALACTOSE, FRUCTOS AND D-XYLOSE IN INFANCY. INVESTIGATIONS BY CONTI UOUS SMALL INTESTINAL PERFUSION. (Ger.) Beyreis K.; Hoepffner, W.; Muller, F. (Karl-Marx-Universi Bereich Medizin, Kinderklinik, DDR-705 Leipzig, Oststrasse 21-25, E. Germany). *Wiss. Z. Karl-Mar Univ. Leipzig* [*Math. Naturwiss.*] 25(2):145-154; 1976.

'26 ABSORPTION OF CARBOHYDRATES AND LIPIDS
AFTER TRANSPLANTATION OF TOTAL SMALL BOWEL
bstract]. (Eng.) Kirpatovsky, I.; Panichenko,
; Lysenko, A. (P. Lumumba People's Friendship
iv., Dept. Operative Surgery, ul. Ordjonikidze 3,
scow, USSR). *Eur. Surg. Res.* 8(Suppl. 2):65; 1976.

'27 CURRENT CONCEPTS IN THE PHYSIOLOGY OF FAT
ABSORPTION. (Ger.) Gangl, A. (Ordinariat
ır medizinische Computerwissenschaften der Univer-
itat Wien, Vienna, Austria). *Wien. Klin. Wochenschr.*
(19):618-621; 1976.

2728 SODIUM SULFATE-35 INTESTINAL ABSORPTION STUDIES IN DOG AND MAN [Abstract]. (Eng.) Bauer, J. H.; Butt, J.; Nichols, W. K. (Univ. Missouri Medical Center, Columbia, MO). *Clin. Res.* 25(1): 16A; 1977.

See also, 2962, 2967, 2968, 2977, 2999, 3011, 3017, 3024, 3038, 3148, 3236.

MOTILITY

'29 EXPLORATION OF DIGESTIVE ELECTROPHYSIOLOGY
WITH A NEW TECHNIQUE: ELECTROINTRAPERI-
NEOGRAPHY (E.I.G.). (Fre.) Santini, R.; Thouve-
t, J.; Brard, E. (Laboratoire de Physiologie-
iarmacodynamie, INSA, bat. 406, 20 avenue Albert
instein, 69621, Villeurbanne, France). *C. R. Soc.*
ol. (Paris) 170(2):398-404; 1976.

ie use of electrointraperitoneography in re-
ording digestive motility in different species of
imals is reported. An electrode with a diameter
150 μm is placed in a trocar and is inserted
ıto the abdominal muscles. In anesthetized rats,
ısic electrical rhythms (BER) were recorded most
equently in the jejunum, whereas in anesthetized
bbits, both BER and action potential spikes were
corded in the ileum. These types and sites of
tivity were also reported in conscious dogs.

'30 ACETYLSALICYLIC ACID AND GASTROINTESTINAL
PROPULSION IN THE RAT. (Eng.) Frenning,
.; Johansson, H.; Nilsson, F.; Ohrn, P. G.; Olazabal,
. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Scand.*
Gastroenterol. 12(2):249-252; 1977.

ie possible influence of moderate amounts of acetyl-
alicylic acid (ASA) on gastric emptying, duodeno-
astric reflux, and small bowel propulsion was studied
Sprague-Dawley rats with permanent gastric and duo-
enal tubes. The ASA-containing or the control solu-
ion was introduced intragastrically 0.5 hr before the
imultaneous administration of radio-labeled test meals
ıto the stomach or duodenum. ASA was given as a 7.5
r 15.0 mM solution in 100 mM HCl or in 100 mM NaCl.
here were no significant differences in weight de-
elopment, gastric evacuation, or gastroduodenal reflux
etween the controls and any of the experimental groups.
n the control group that received 100 mM HCl, the small
owel length passed by 75, 50, and 25% of the test meal
uring 15 min was significantly less than in the group
iven 7.5 mM ASA in 100 mM HCl. Apart from this, there
ere no differences between the groups in small bowel
ropulsion. The results indicate that bile reflux or
elayed gastric evacuation have no role in the pathogenesis of the mucosal damage seen after therapeutic doses of ASA.

2731 RELAXATION OF THE LOWER OESOPHAGEAL SPHINCTER DURING SWALLOWING. (Eng.) Davison, J. S. (Dept. Physiology, The Univ., Dundee DD1-4HN, Scotland). *Digestion* 15(1):73-76; 1977.

A rapid pull-through technique was used to measure lower esophageal sphincter (LES) pressure before and immediately after swallowing in 10 subjects. In all subjects, under normal resting conditions, a distinct LES pressure profile was measured on every occasion during a pull-through. However, when the pull-through was carried out after a swallow, the recorded pressure usually changed from intragastric to intraesophageal with little or no intervening high pressure zone. In all such cases, powerful primary peristaltic waves were recorded a few seconds after the catheter had passed into the esophagus. The persistence of an attenuated profile was associated with relatively weakly developed peristalsis. In each subject, the mean LES pressure after a swallow was significantly lower than the mean control value. It is concluded that the reduction in recorded LES pressure is caused by sphincter relaxation following a swallow.

2732 STIMULATION OF LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) BY CIMETIDINE--A DOUBLE-BLIND STUDY. (Eng.) Roesch, W.; Lux, G.; Schittenhelm, W.; Demling, L. (Medizinische Universitatsklinik, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepato-gastroenterol.* 23(6):423-425; 1976.

Using the rapid pull-through technique, the effect of p.o. administration of cimetidine on lower esophageal sphincter pressure (LESP) was studied in 14 volunteers. The subjects received in randomized order either two doses of 200 mg cimetidine or placebo in a double blind study. The integrated mean pressure was significantly higher following the administration of cimetidine (162.6 ± 67.3 mm Hg/min) than in controls (112.0 ± 40.3 mm Hg/min, $0.05>p>0.02$). In comparison with controls, the pentagastrin-stimulated (0.6 μg/kg) LESP was significantly higher ($p<0.05$) in the cimetidine-treated subjects. LESP was not affected by the infusion of atropine sulphate (25 μg/kg/hr) in either group. Cimetidine may stimulate LESP by blocking inhibitory gastrin receptors, such as somatostatin.

2733 EFFECT OF CIMETIDINE ON LOWER ESOPHAGEAL SPHINCTER PRESSURE, INTRAGASTRIC pH AND SERUM LEVELS OF IMMUNOREACTIVE GASTRIN IN MAN.

(Eng.) Siewert, R.; Lepsien, G.; Arnold, R.; Creutzfeldt, W. (Dept. General Surgery, Univ. Gottingen, Gosslerstrasse 10, 34 Gottingen, W. Germany). *Digestion* 15(1):81-85; 1977.

The influence of cimetidine on the lower esophageal sphincter (LES) pressure, the intragastric pH, and the serum levels of immunoreactive gastrin was investigated in eight healthy volunteers and the values were compared with those in eight controls. The LES pressure rose from 15.6 ± 1.1 to 22.7 ± 1.8 mm Hg ($p<0.05$) 20 min after the administration of cimetidine (400 mg, p.o.), and to 25.8 ± 2.0 mm Hg after 30 min ($p<0.001$). This pressure increase paralleled a rise in intragastric pH; the basal value was 1.7 ± 0.1, whereas the values 20, 60, and 120 min after cimetidine administration were 4.3 ± 0.9, 6.2 ± 0.4, and 4.25 ± 0.75, resp. In these subjects, the serum immunoreactive gastrin levels did not change. It is concluded that the rise in serum immunoreactive gastrin after the instillation of antacids into the stomach may be caused by distention of the antrum.

2734 THE MECHANISM OF ACTION OF GASTRIN ON THE LOWER ESOPHAGEAL SPHINCTER.

(Eng.) Rattan, S.; Coln, D.; Goyal, R. K. (Southwestern Medical Sch., Dallas, TX 75235). *Gastroenterology* 70(5):828-831; 1976.

The influence of atropine, metiamide, and tetrodotoxin on the effect of gastrin I or pentagastrin on lower esophageal sphincter pressure was studied in 29 opossums. Gastrin I (0.0075-10 μg/kg) or pentagastrin (2 μg/kg) caused contraction of the lower esophageal sphincter in anesthetized opossums. The contraction was not modified, either qualitatively or quantitatively, by 30 or 1,000 μg/kg atropine pretreatment. Moreover, neural block with tetrodotoxin (10-60 μg/kg, i.v.) did not influence the effect of gastrin on the sphincter pressure. Metiamide (2 mg/kg/hr or 10 mg/kg bolus, i.v.) did not modify the magnitude of the contractile response of the lower esophageal sphincter to gastrin I. These studies indicate that gastrin does not cause sphincter contraction by stimulating cholinergic neurons and that gastrin does not exert an inhibitory effect on the sphincter pressure by stimulating H_2 receptors. It is suggested that gastrin may contract the lower esophageal sphincter by a direct action of the sphincter muscle.

2735 ENDOGENOUS MOTILIN AND LOWER EXOPHAGEAL SPHINCTER PRESSURE IN MAN: CLUE TO AN ASSOCIATION.

(Eng.) Domschke, W.; Lux, G.; Mitznegg, P.; Rosch, W.; Domschke, S.; Bloom, S. R.; Wunsch, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-852 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 23(4):274-275; 1976.

The effects of endogenous motilin released by duodenal acidification on lower esophageal sphincter pressure (LESP) were studied in five healthy men. Three to four minutes after duodenal acidification by 0.1 N HCl (50 ml) instillation, the peak LESP was significantly elevated over the basal level by about 80% ($p<0.025$). This increase coincided with a rise in the plasma motilin level; the peak plasma motilin level exceeded the basal level by about 90% ($p<0.05$). The results indicate that motilin is involved in the intrinsic regulation of the lower esophageal sphincter.

2736 INTESTINAL TRANSIT IN RURAL AND URBAN POPULATION OF GREECE.

(Eng.) Manousos, O. N.; Nicolaou, A.; Zografos, A.; Trichopoulos, D.; Merikas, G. (Hippokration Hosp., Athens 610, Greece). *Digestion* 15(1):77-80; 1977.

Intestinal transit times and daily stool weights wer measured in 14 residents of Athens and 22 residents in rural Greece. The subjects in rural Greece had significantly shorter transit times (38.4 versus 56.8 hr, $p<0.02$) and heavier daily stools (172 versu 131 g, $p<0.05$) than those living in Athens. These findings may be attributable to the more refined die of the urban Greek population and may explain the different incidence of certain bowel diseases in the urban and rural Greek populations.

2737 ELECTRICAL SPIKE POTENTIALS OF THE SMALL BOWEL: A COMPARATIVE STUDY OF RECORDINGS OBTAINED FROM MUSCULAR IMPLANTED AND INTRALUMINAL SUCTION ELECTRODES.

(Eng.) Fleckenstein, P.; Oigaard, A. (Rigshospitalet, DK 2100 Copenhagen, Denmark). *Am. J. Dig. Dis.* 21(11):996-999; 1976.

Simultaneous spike potential recordings were obtaine in anesthetized dogs with intramuscular implanted electrodes, as well as intraluminal suction electrodes located on the same level. Number, amplitud duration, and time of onset of the potentials were compared from the two tracings to assess the reliability of intraluminal electrodes for clinical use The spike potentials from the intramuscular electro had a very similar appearance to those recorded fro intraluminal electrodes. However, the mean values for maximum and average action potential recorded b implanted electrodes (0.9 and 0.5 mV, resp.) were significantly higher than the corresponding figures from the suction electrodes (0.2 and 0.1 mV). Othe wise, the potentials were identical in number, duration, and time of onset. Thus, spike potentials recorded from suction electrodes, as used in clinical motility studies, accurately represent the eve within the muscular layer.

8 ACTION OF CAERULEIN, GLUCAGON OR PROSTA-
GLANDIN E_1 ON THE MOTILITY OF INTESTINAL
LI. (Eng.) Ihasz, M.; Koiss, I.; Nemeth, E. P.;
ly, G.; Papp, M. (Second Surgical Clinic, Semmel-
s Medical Univ., Budapest, Hungary). *Pfluegers*
h. 364(3):301-304; 1976.

kinetics of the effects of cerulein, glucagon,
prostaglandin E_1 on canine intestinal villous
ility were investigated. Cerulein (2.5-25 pg) in-
ased villous contraction in jejunal loops signifi-
tly ($p<0.01$). Jejunal motility also increased.
imilar response was observed with glucagon (125 ng-
g, $p<0.01$). Prostaglandin E_1 (250 ng/1 μg) signi-
antly decreased villous contractions ($p<0.01$).
relationship between the natural logarithm of the
g doses and their effect was linear in all three
es.

9 THE MODULATION OF THE PROSTAGLANDIN-
INDUCED (E_1, E_2, $F_{2\alpha}$) MOTILITY OF THE LARGE
ESTINE BY THE ADRENERGIC SYSTEM. (Eng.) Bruch,
P.; Schmidt, E.; Laven, R. (Dept. Surgery, Univ.
zburg, Josef-Schneider-Str. 2, D-8700 Wurzburg,
Germany). *Acta Hepatogastroenterol.* 23(6):430-
; 1976.

colonic motility is produced by the interaction
the cholinergic parasympathetic and the adrenergic
pathetic systems, the effects of adrenergic stim-
tors and inhibitors on prostaglandin-stimulated
onic motility were studied in 20 human taenia
i strips. Prostaglandin (10^{-4}-1 μg/ml)-induced
tractions were unaffected by α- and β-receptor
agonists. Contractions produced by 1 μg/ml pros-
landin were completely eliminated by adrenalin
μg/ml), noradrenalin (1 μg/ml), and isoproterenol
x 10^{-1}-10 μg/ml). β-Blockade with propranolol
μg/ml) and the addition of adrenalin or noradren-
n resulted in a 200% increase in prostaglandin-
uced tension. The increase in prostaglandin-
uced contraction by catecholamines and β blockade
neutralized by the α-receptor antagonist phentol-
ne (1 μg/ml). The results indicate the presence
α-receptors in the human large intestine.

0 THE MOTOR-STIMULATING EFFECT OF RECTALLY
ADMINISTERED METOCLOPRAMIDE ON THE HUMAN
DENUM. (Eng.) Fleckenstein, P.; Oigaard, A.;
ph, S. (Rigshospitalet, Blegdamsvej 9, DK-2100
enhagen O, Denmark). *Dan. Med. Bull.* 23(6):300-
; 1976.

denal motility was studied before and after the
tal administration of metoclopramide (40 mg) in
healthy volunteers, and the results were compared
those obtained previously in 20 subjects who re-
ved the same dose i.v. A comparison of cumula-
e sum charts of duodenal activity after both
tes of administration revealed that the motor-
mulating effect after i.v. administration occurred
ost immediately, whereas the stimulation after
tal administration was delayed by about 15 min
-23 min). However, the effect was of the same
ler of magnitude during the observation period,
indicated by the identical linear gradient of the
two curves. The results indicate that biologically active quantities of metoclopramide are absorbed from the human rectum.

2741 PHARMACOLOGICAL ANALYSIS OF PERISTALSIS OF THE ISOLATED GUINEA PIG ILEUM BY TETRAMETHYLAMMONIUM. (Fre.) Beleslin, D.; Samardzic, R.; Malobabic, Z. (Institut de Pharmacologie, Faculte de Medecine, 11000 Beograd, C.P. 662, Yugoslavia). *C. R. Soc. Biol. (Paris)* 170(2):331-335; 1976.

Pharmacological analysis of the inhibition of tetramethylammonium (TT)-induced peristalsis of the isolated guinea pig ileum was examined. At low concentrations, TT (5 μg/ml) contracted the longitudinal muscle, but it only blocked the peristaltic reflex at higher doses (25 μg/ml). Acetylcholine (30-60 μg/ml), methacholine (5-30 μg/ml), and carbachol (0.05-0.15 μg/ml) reversed the TT-induced block. Propionylcholine and butyrylcholine (50-500 μg/ml) could not reverse the block in the presence of TT, although they did contract the longitudinal musculature. Eserine (0.005-0.015 μg/ml) and neostigmine (0.005-0.2 μg/ml) reversed the TT-induced block and produced regular peristaltic waves after some latency. Nicotine (25-100 μg/ml), pilocarpine (2-10 μg/ml), 5-hydroxytryptamine (0.5-10.0 μg/ml), arecoline (0.015-0.03 μg/ml), and histamine (1-20.0 μg/ml) did not reverse the TT-induced block. The cholinoceptive ganglia of the myenteric plexus appears to be the predominant site of the depressive effect of TT.

2742 THE PARTICIPATION OF ENTERIC INHIBITORY NERVES IN ACCOMMODATION OF THE INTESTINE TO DISTENSION. (Eng.) Furness, J. B.; Costa, M. (Flinders Univ. of South Australia, Bedford Park, South Australia 5042, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(1):37-41; 1977.

To test the hypothesis that the enteric inhibitory nerves participate in the accomodation of the intestine to distension, experiments were carried out on isolated segments from the distal colon of the guinea pig. When a weight was applied to the colon in a control solution, the wall distended very quickly at first, then distended more slowly over the 20 sec before the weight was removed. In the presence of tetrodotoxin (10^{-7} g/ml), the second, slow phase of distension was usually abolished, and the circular muscle sometimes contracted back towards its original length during this period. The resting length of the circular muscle did not change when tetrodotoxin was added to the organ bath. Tetrodotoxin reduced the distensibility of the colon to about half when compared with the control, but other drugs (i.e., bretylium, 10^{-6} g/ml; guanethidine, 10^{-6} g/ml; hyoscine, 6 x 10^{-7} g/ml; or methysergide, 10^{-6} g/ml) had no significant effect. It is concluded that a local reflex involving enteric inhibitory nerves causes an accommodation of the intestine to stretch.

2743 EFFECT OF PROSTAGLANDIN E_1 ON RAT GASTRIC MOTILITY AND CYCLIC NUCLEOTIDE CONTENT. (Eng.) Shearin, N. L.; Pancoe, W. L.

(Faculty Medicine, Memorial Univ. Newfoundland, P.O. Box 129, St. John's, Newfoundland A1C 5S7, Canada). *Experientia* 32(12):1553-1554; 1976.

The effect of prostaglandin E_1 (PGE_1) on gastric motility and cyclic nucleotide content was studied *in vivo* in male Holtzman rats. Five rats received daily i.p. injections of PGE_1 (4.5 mg/kg). A telemetry system was used to monitor stomach motility. The mean motility index in the treated rats was significantly higher than that in controls (84 ± 8.20 versus 61 ± 16.10, $p<0.05$). The cyclic AMP concentration in the PGE_1-treated animals (5 ± 1.20 pmol/g tissue) was significantly lower than that in controls (16 ± 1.40 pmol/g, $p<0.05$), and the cyclic guanosine monophosphate level was significantly higher in the treated animals (0.45 ± 0.03 versus 0.30 ± 0.20 pmol/g). It is concluded that the administration of PGE_1 influences total fundic tissue levels of the two cyclic nucleotides and serves as a positive feedback on cholinergic activity. The increase or decrease in contractile activity is affected by the interaction between exogenous PGE_1, cyclic AMP, and cyclic guanosine monophosphate and is controlled by significant decreases in the tissue levels of these two cyclic nucleotides.

2744 EFFECT OF TRYPTOPHAN AND ITS METABOLITES ON GASTRIC EMPTYING OF LIQUID MEALS IN DOGS. (Eng.) Cooke, A. R.; Ward, W. O. (Veterans Admin. Hosp., Iowa City IA 52240). *Proc. Soc. Exp. Biol. Med.* 152(4):656-658; 1976.

The effects of tryptophan and its metabolites were studied in five dogs with chronic gastric fistulas to determine whether the known inhibiting effect of trytophan on emptying is due to local or systemic effects or to trytophan metabolites. The instillation of 300 ml of DL-kynurenine (5 mM), 5-hydroxytryptophan (5 mM), or 5-hydroxytryptamine (20 mM) into the gut did not slow gastric emptying. Furthermore, the i.v. infusion of L-tryptophan (5, 20, and 50 mM), DL-kynurenine (2, 5, and 10 mM), 5-hydroxytryptamine (2 and 10 mM), and 3-indolepyruvic acid (2, 5, and 10 mM) failed to slow gastric emptying. The results indicate that tryptophan slows gastric emptying by exciting a receptor in the gut and not by a direct effect on the stomach or brain or via its major metabolites.

2745 ELECTROMYOGRAPHY OF THE SPHINCTER OF ODDI IN THE RABBIT. II. EFFECT OF VAGOTOMY, HEXAMETHONIUM AND ALCOHOL. (Fre.) Sarles, J. C.; Midejean, A.; Devaux, M. A.; Gastagnini, A. (Service de Chirurgie, C.H.U., Hopital d'Aubagne, avenue de Petit-Canedel, F 13667 Aubagne, France). *Biol. Gastroenterol. (Paris)* 9(1):25-32; 1976.

The effects of vagotomy, hexamethonium bromide (1-2 mg/kg/hr, i.v.), or *in vitro* or i.v. alcohol (1 g/kg) on the sphincter of Oddi were studied in rabbits. Hexamethonium decreased electrical activity and biliary pressure. *In vitro* alcohol had no effect on the sphincter, however the slow i.v. infusion of alcohol caused increased electrical activity. Vagotomy provoked a transient depression (30-60 min) of the electrical activity and greatly decreased the effect of alcohol. I.v. hexamethonium (2 mg/kg/hr) completel eliminated the stimulating effect of alcohol. Alcohol apparently acts upon the sphincter of Oddi through a nerve pathway that includes the vagus nerve.

2746 A SPECIAL CLOSURE SYSTEM OF THE GASTROINTESTINAL TRACT OF THE RAT. AN EXPERIMENTAL STUDY OF THE STRUCTURE AND FUNCTION OF A GASTROINTESTINAL CLOSURE SYSTEM. (Ger.) Werner, B.; Knipper, A.; de Heer, K.; Soehendra, N.; Eichen, R. (Chirurgischen Universitatsklinik Hamburg, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Langenbecks Arch. Chir.* 341(4):281-288; 1976.

2747 ACTION OF CHOLECYSTOKININ, CAERULEIN AND TERMINAL OCTAPEPTIDE ON THE ACTIVITY OF THE ODDI SPHINCTER OF THE RABBIT [Abstract]. (Eng.) Sarles, J. C.; Bidart, J. M.; Delecourt, R. (Hopital d'Aubagne, 13667 Aubagne, France). *Eur. Surg. Res.* 8(Suppl. 1):69-70; 1976.

2748 GASTROINTESTINAL HORMONES (PANCREOZYMIN-SECRETIN) IN THE DEVELOPMENT OF BENIGN STENOSIS OF THE PAPILLA OF VATER [Abstract]. (Eng.) Boeckl, O.; Chmelizek, F.; Hell, E.; Laszcz, M.; Menzel, C.; Umlauft, M.; Zimmermann, G. (Ludwig Bolzmann Institut f. experimentelle Chirurgie, A5020 Salsburg, Landeskrankenhaus, Austria). *Eur. Surg. Res.* 8(Suppl. 1):70-71; 1976.

2749 THE EFFECT OF DIFENOXIN ON THE LOWER ESOPHAGEAL SPHINCTER PRESSURE IN MAN. (Eng.) Bron, B. A.; Krejs, G. J.; Peter, P.; Blum, A. L. (Stadtspital Triemli, Zurich, Switzerland). *Arch. Intern. Pharmacodyn. Ther.* 222(1):40-44; 1976.

2750 ROLE OF HISTAMINERGIC RECEPTORS IN THE CONTROL OF HUMAN LOWER ESOPHAGEAL SPHINCTE (LES) FUNCTION [Abstract]. (Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Clin. Res.* 24(5):628A; 1976.

2751 CONTRIBUTION TO THE STUDY OF THE HORMONAL CONTROL OF THE GUT MOTILITY IN MAN [Abstract]. (Eng.) Dauchel, J.; Schang, J. C.; Mendel, C.; Grenier, J. F. (Unite de Recherches 61 de l'INSERM--"Chirurgie Experimentale et Biophysiopathologie Digestive"--Avenue Moliere 67200 Strasbourg, Hautepierre, France). *Eur. Surg. Res.* 8(Suppl. 1):5; 1976.

2752 CORRELATION BETWEEN MOTILITY AND ELECTRIC ACTIVITIES OF THE INTESTINE [Abstract]. (Eng.) Eloy, R.; Lambert, A.; le Hauan, J.; Grenie J. F. (U 61 Avenue Moliere, Strasbourg 67200, France). *Eur. Surg. Res.* 9(Suppl. 1):158; 1977.

53 MESENTERIC HAEMODYNAMIC EFFECTS OF INTES-
TINAL MOTILITY [Abstract]. (Eng.) Kachel-
ffer, J.; Pousse, A.; Hohmatter, D.; Grenier, J. F.
nite 61 de l'INSERM, Chirurgie Experimentale et
ysiopathologie Digestive, Avenue Moliere, F 67200
rasbourg, Hautepierre, France). *Eur. Surg. Res.*
Suppl. 2):60-61; 1976.

54 SMALL INTESTINAL MOTILITY IN THE EXPERI-
MENTAL DUMPING SYNDROME [Abstract].
ng.) Humphreys, W. G.; Parks, T. G.; Buchanan,
D.; Love, A. H. G. (Inst. Clinical Science, Queen's
iv., Belfast, N. Ireland). *Eur. Surg. Res.*
Suppl. 2):76-77; 1976.

55 EXPERIMENTAL STUDIES ON THE EFFECT OF
REVERSED SMALL BOWEL SEGMENTS TO DELAY
TESTINE PASSAGE AFTER TOTAL COLECTOMY [Abstract].
ng.) Muller, G.; Kieninger, G.; Breucha, G.;
igt, H.; Schmidt, K. H. (Chirurg. Klinik Tubingen,
Tubingen, W. Germany). *Eur. Surg. Res.* 8(Suppl.
:77-78; 1976.

56 MEASUREMENT OF RECTAL POTENTIAL DIFFERENCE:
EFFECTS OF AMILORIDE AND SPIRONOLACTONE
MAN [Abstract]. (Eng.) Mohamed, F. I.; McSorley,
; Polak, A.; Parsons, B. (St. Mary's Hosp., Ports-
uth, England). *Clin. Sci. Mol. Med.* 52(2):21p;
77.

57 COMPARATIVE STUDY ABOUT ELECTRODOGRAPHY
OF MAN AND DOG'S ILEUM AND CAECUM [Ab-
ract]. (Eng.) Isman, H.; Lebreton, E.; Brizard,
; Valici, A. (Hopital Saint-Roch 5, rue Pierre
voluy, Nice 06000, France). *Eur. Surg. Res.*
Suppl. 2):70-71; 1976.

58 INFLUENCE OF SEX AND SEXUAL HORMONES IN
THE BRADYKININ-RECEPTOR INTERACTION IN THE
INEA PIG ILEUM. (Eng.) Weinberg, J.; Diniz, C.
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B, UFMG, Belo Horizonte, CP. 2486, Brazil). *Bio-*
em. Pharmacol. 25(4):433-437; 1976.

59 "MINUTE-RHYTHM"-TYPE CONTRACTIONS INDUCED
BY MOTILIN AND ACETYLCHOLINE IN THE
RCULAR MUSCLE LAYER OF RABBIT DUODENUM [Abstract].
ng.) Mayer, C. J.; Ruppin, H.; Riemer, J.;
lling, K.; Domschke, W.; Wunsch, E.; Demling, L.
hysiologisches Institut, Pettenkoferstr. 12,
8000 Munchen 2, W. Germany). *Pfluegers Arch.*
8(Suppl.):R24; 1977.

60 THE EFFECT OF 13-NORLEUCINE MOTILIN ON
THE ELECTRICAL ACTIVITY OF RABBIT CIRCULAR
ODENAL MUSCLE [Abstract]. (Eng.) Riemer, J.;
lling, K.; Ruppin, H.; Mayer, C. J.; Wunsch, E.
ept. Physiology, Univ. Munich, Pettenkoferstr. 2,
8000 Munchen, W. Germany). *Pfluegers Arch.*
8(Suppl.):R24; 1977.

2761 DIRECT EFFECTS OF 13-NORLEUCINE MOTILIN ON THE ELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED PERFUSED CANINE STOMACH AND DUODENUM [Abstract]. (Eng.) Green, W. E. R.; Ruppin, H.; Wingate, D. L.; Domschke, W.; Wunsch, E.; Demling, L.; Ritchie, H. D. (London Hosp., London, E.1, England). *Eur. Surg. Res.* 8(Suppl. 1):59; 1976.

2762 THE EFFECTS OF GASTRIC OPERATIONS UPON GASTRO-DUODENAL MOTILITY [Abstract]. (Eng.) Alexander-Williams, J.; Donovan, I. A.; Keighley, M. R. B.; Griffin, D. W.; Harding, L. K. (General Hosp., Birmingham B4 6NH, England). *Eur. Surg. Res.* 8(Suppl. 2):75-76; 1976.

2763 THE EFFECT OF GASTRIC RESECTION ON THE PACESETTER POTENTIAL OF THE STOMACH AND DUODENUM [Abstract]. (Eng.) O'Leary, J. F.; Hennessy, T. P. J. (Dept. Surgery, Univ. Coll. Cork, Cork, Ireland). *Eur. Surg. Res.* 8(Suppl. 2):74-75; 1976.

2764 GASTROINTESTINAL PROPULSION AFTER LAPAROTOMY--ROLE OF EXPERIMENTAL PROCEDURES AND ADRENAL ACTIVITY [Abstract]. (Eng.) Ohrn, P. G.; Johansson, H.; Nilsson, F. (Univ. Hosp., Uppsala, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):68-69; 1976.

2765 EFFECTS OF PROXIMAL GASTRIC VAGOTOMY AND TRUNCAL VAGOTOMY ON THE COORDINATION OF GASTRIC AND DUODENAL MYOELECTRICAL ACTIVITIES IN THE FASTING DOG [Abstract]. (Eng.) Aeberhard, P.; Bedi, B. S. (Inselspital, CH-3010 Bern, Switzerland). *Eur. Surg. Res.* 8(Suppl. 2):73-74; 1976.

2766 CONTROL OF GASTRIC EMPTYING BY CIRCUMFERENTIAL JEJUNAL MYECTOMY:--A POSSIBLE TREATMENT FOR POST-GASTRECTOMY DUMPING [Abstract]. (Eng.) Gay, R. J.; Beesley, W. H. (Dept. Surgery, Trinity Coll., Dublin 2, Ireland). *Eur. Surg. Res.* 8(Suppl. 1):59-60; 1976.

2767 VAGOTOMY AND GASTRIC RESERVOIR FUNCTION [Abstract]. (Eng.) Jahnberg, T.; Abrahamsson, H.; Haglund, M.; Jansson, G.; Martinson, J. (Sahlgren's Hosp., Goteborg, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):69-70; 1976.

2768 INTESTINAL FLOW RATES AND MEAN TRANSIT TIMES AND THEIR RELATION TO GASTRIC EMPTYING. (Eng.) Johansson, C.; Lagerlof, H. O.; Ekelund, K. (No affiliation given). *Mt. Sinai J. Med.* 43:58-67; 1976.

2769 PROSTAGLANDIN FOX-GASTROINTESTINAL PROPULSION AND DUODENOGASTRIC IN THE RAT [Abstract]. (Eng.) Nilsson, F.; Johansson, H.; Ohrn, P. G. (Univ. Hosp., Uppsala, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):75; 1976.

MOTILITY

2770 INFLUENCE OF THE COMPOSITION OF FOOD ON THE GASTRIC EMPTYING PATTERN. (Eng.) Johansson, C. (No affiliation given). *Mt. Sinai J. Med.* 43:45-57; 1976.

2771 INFLUENCE OF LONG-TERM INTERMITTENT EXPOSURES TO LOW OXYGEN TENSIONS ON GASTRIC EMPTYING TIME DURING HYPOXIA. (Eng.) Fang, H. S.; Chen, C. F. (Dept. Physiology, Natl. Taiwan Univ., Taipei, Taiwan). *Environ. Res.* 11(1):135-137; 1976.

See also, 2791, 2805, 2965, 3011, 3135, 3209, 3298
3474.

SECRETION AND METABOLISM

2772 IN VITRO BIOTRANSFORMATION OF OLEIC ACID (I-^{14}C) IN RABBIT CECAL CONTENTS. ROLE OF MICROFLORA AND EXOCRINE PANCREATIC SECRETION. (Fre.) Perret, J. P. (Institut Universitaire de Technologie, Laboratoire de Physiologie, 43, boulevard du 11-Novembre-1918, 69 Villourbanne, France). *Ann. Biol. Anim. Biochim. Biophys.* 16(1):71-84; 1976.

The effect of prior deprivation of pancreatic excretion on the ability of the cecal contents of rabbits to metabolize oleic acid was studied. Some cecal samples were cleared of microorganisms by filtration before incubation with the ^{14}C-labeled oleic acid. Optimal pH was found to be 6-7 (0.05 M phosphate). Six weeks prior to sacrifice for removal of cecal contents, three of six rabbits were subjected to ligature of the main pancreatic duct. Contents from the three control rabbits esterified 22.7-30% of the oleic acid (to phospholipids, sterol esters, methyl ester) in 4-8 hr and hydrogenated 60% of esterified compounds in 8 hr. Operated rabbits had cecal samples that esterified not more than 5% of the oleic acid and hydrogenated only 7%. Oleic acid biotransformation did not occur in the absence of microorganisms. Addition of pancreatic juice to cecal contents of pancreatic secretion-deprived rabbits reestablished esterification to 33%, but hydrogenation remained below control levels.

2773 AUTORADIOGRAPHIC STYDY WITH ^{14}C-LABELLED PENTAGASTRIN IN THE RAT. (Eng.) Varkonyi, T.; Varga, L.; Nafradi, J.; Kozma, M.; Kasa, P.; Varro, V. (Univ. Medical Sch., H-6701, Szeged, Hungary). *Acta Hepatogastroenterol.* 23(6):426-429; 1976.

The metabolism and elimination of ^{14}C-glycine-labeled pentagastrin were studied autoradiographically and by light microscopy in Wistar rats. Twenty-one animals received 500 μg of ^{14}C-glycine-labeled pentagastrin i.v. As early as 10 sec after the injection, activity was observed in the liver and in association with the parietal cells of the gastric mucosa. The radioactivity remained in the liver for a prolonged period (>6 min), while it had disappeared from the parietal cells by 2 min after injection. Activity was detected in the renal tubuli 2 min or more after pentagastrin administration. The highest grain densit
was observed in the liver tissue.

2774 CALCIUM METABOLISM AND AMYLASE RELEASE I
RAT PAROTID ACINAR CELLS. (Eng.) Kanagasuntheram, P.; Randle, P. J. (Faculty Medicine,
Univ. Singapore, Singapore 3). *Biochem. J.* 160(3)
547-564; 1976.

2775 NEW EXPERIMENTAL FINDINGS ON SATURATION PHENOMENA DURING BSP INFUSION [Abstract] (Eng.) Milanese, M.; Molino, G.; Cavanna, A.; Avagnina, P.; Gaidano, G. (Istituto di Elettrotecnica, Politecnico di Torino, CENS, Torino, Italy). *Digestion* 14(5/6):484-485; 1976.

2776 SULFATION OF BILE SALTS IN THE ISOLATED PERFUSED RAT KIDNEY [Abstract]. (Eng.) Czygan, P.; Ast, E.; Frohling, W.; Stiehl, A.; Kommerell, B. (Medizinische Universitatsklinik, Heidelberg, W. Germany). *Digestion* 14(5/6):474-47
1976.

2777 SUBMAXILLARY SECRETION IN RATS TREATED
GUANETHIDINE. (Eng.) Eccher, S.; Dodson, C.; Quissell, D. O.; Martinez, J. R. (Univ. Missouri, Sch. Medicine, Columbia, MO 65201). *Eu*
J. Pharmacol. 41(2):113-121; 1977.

2778 5, Nα-DIMETHYL HISTAMINE: AN ANALOG OF
HISTAMINE THAT GIVES HIGHER MAXIMAL RAT
OF ACID SECRETION THAN HISTAMINE [Abstract]. (En
Impicciatore, M.; Bertaccini, G.; Mossini, F.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(2):109A; 1977.

2779 MECHANISMS OF ACID SECRETORY RESPONSE
AMINO ACID SOLUTIONS IN NORMAL MAN [Ab-

tract]. (Eng.) Feldman, M.; Richardson, C. T.; alsh, J. H. (Univ. Texas Health Science Center, allas, TX). *Clin. Res.* 25(3):467A; 1977.

780 RELEASE OF ANTRAL GASTRIN BY INFUSION OF LIVER EXTRACT INTO THE SMALL INTESTINE OF OGS [Abstract]. (Eng.) Thompson, M. R.; Debas, . T.; Walsh, J. H.; Grossman, M. I. (Royal nfirmary, Manchester, England). *Gut* 17(5):393; 976.

See also, 2860.

SECRETION AND METABOLISM

Stomach

781 LATERAL HYPOTHALAMIC "FEEDING" SITES AND GASTRIC ACID SECRETION. (Eng.) Wyrwicka, . (Veterans Admin. Wadsworth Hosp. Center, Los ngeles, CA 90024). *Experientia* 32(10):1287-1289; 976.

o determine whether the lateral hypothalamic strucures that govern the initiation of feeding also inluence gastric acid secretion, experiments were caried out in gastric fistula cats in which feeding was voked by electrical stimulation of the lateral hypohalamus. Electrical stimulation that had been efective in evoking stimulus-bound feeding in satiated ats did not produce any significant stimulating efect on gastric acid secretion in the same cats when hey were hungry ($p>0.05$). The results are not conistent with those previously reported in which gasric acid secretion increased in response to electrial stimulation.

782 COBALAMIN BINDING PROTEINS IN STOMACH AND SERUM FROM VARIOUS ANIMAL SPECIES DATA FOR $_{12}$ BINDING CAPACITIES AND MOLECULAR SIZES OF THE INDING PROTEINS. (Eng.) Hippe, E.; Jorgensen, . S.; Olesen, H. (Bispebjerg Hosp., Glostrup, Denark). *Comp. Biochem. Physiol.* [*B*] 56(3B):305-309; 977.

he cobalamin-binding capacity of stomach mucosa nd serum from 38 animal species, including man, ere determined, and the size of binding in terms f Stokes radius and estimated molecular mass was easured. The binding capacity for exogenous cobalamin varied from 0.75 nmol/kg (lugworm) to 570 nmol/g (pig). In the serum, the capacity was 0.4 nM (ferret) to 270 nM (grass snake). The cobalamin-inding capacity of serum was not correlated to the erum cobalamin concentration in the various species, xcept for the nine fish species (hagfish, lamprey, spiny dogfish, eel, plaice, ray, starry rat, sea trout, and cod); in these species, the correlation coefficient was 0.65 ($p<0.05$). The Stokes radius f the cobalamin-binding proteins varied from 1 to nm both in the mucosa and in serum. In the mamals, it was 2.5 to 5.5 nm; in humans, the binders had relative molecular weights of 35,000 or 50,000-60,000.

2783 RENAL EXTRACTION OF ENDOGENOUS GASTRIN IN PATIENTS WITH NORMAL RENAL FUNCTION. (Eng.) Schjonsby, H.; Willassen, Y. (Medical Dept. A, Univ. Bergen, 5016 Haukeland Hosp., Bergen, Norway). *Scand. J. Gastroenterol.* 12(2):205-207; 1977.

Renal gastrin excretion was assessed in 23 subjects by measuring gastrin levels in the brachial artery and the renal vein. There was no significant difference in arterial gastrin (37.7 ± 25.1 pg/ml serum) and the renal vein gastrin (35.9 ± 24.6 pg/ml) in the fasting subjects, resulting in a renal extraction ratio for gastrin not significantly different from zero ($p>0.5$). Among three patients who had consumed a protein-rich meal, two showed no gastrin extraction during two consecutive periods, while the third showed a gastrin extraction of 0.12 in the second period. The cause of hypergastrinemia in renal failure is still uncertain, but could be due either to increased gastrin production or to decreased elimination. The results, however, do not support the hypothesis that hypergastrinemia is due to decreased elimination by the kidney.

2784 GASTRIN, ANTRAL G CELLS, AND GASTRIC ACID IN SECRETAGOGUE-INDUCED AND ANTIHISTAMINE-INHIBITED DUODENAL ULCERS. (Eng.) Joffe, S. N.; Polak, J. M.; Pallone, F.; Bloom, S. R.; Gaskin, R. J.; Barros D'Sa, A. A. J.; Baron, J. H. (Royal Infirmary, Glasgow, G4 OSF, Scotland). *Scand. J. Gastroenterol.* 12(1):27-32; 1977.

The effects of the antihistamine derivative Pfizer UK-9040 on basal and secretagogue-stimulated gastric secretion, plasma and antral G cell gastrin levels, and ulcerogenesis in fasted Wistar albino rats were investigated. Control and operated (pylorus ligated and catheter inserted) rats were divided into four treatment groups receiving: s.c. saline, oral pretreatment with UK-9040 (100 mg/kg) followed by s.c. saline, s.c. infusion of ulcerogenic levels of the secretagogues pentagastrin (4 μg/kg/min) and carbachol (0.8 μg/kg/min), and oral pretreatment with UK-9040 (100 mg/kg) followed by an s.c. infusion of pentagastrin (4 μg/kg/min) and carbachol (0.8 μg/kg/min). Hypergastric secretion induced by secretagogues was inhibited 58% by pretreatment with UK-9040, although maximal secretion at 6 hr was still elevated four times over that in controls. UK-9040 elevated levels of total plasma gastrin from 6.9 ± 1.2 to 39.7 ± 8.5 fm/ml ($p<0.001$) at 24 hr. Secretagogue infusion produced no elevation of plasma gastrin, and reduced the stimulatory effects of UK-9040. Control and secretagogue-treated rats were found to have normal levels of antral G cell gastrin, while UK-9040 treatment markedly reduced gastrin content and cell size. Duodenal ulcers were found in all of the secretagogue-treated rats, but in only one-third of the rats treated with UK-9040 and secretagogue. It was concluded that UK-9040 directly inhibits gastric parietal cell acid secretion, while directly or indirectly stimulating release of gastrin from antral G cells, causing the elevation of plasma gastrin.

2785 EFFECTS OF COMMON INHIBITORS OF GASTRIC ACID SECRETION ON SECRETAGOGUE-INDUCED RESPIRATION AND AMINOPYRINE ACCUMULATION IN ISOLATED GASTRIC GLANDS.

(Eng.) Berglindh, T. (Biomedical Center, Univ. Uppsala, Uppsala, Sweden). *Biochim. Biophys. Acta* 464:217-233; 1977.

The effects of three inhibitors of gastric acid secretion were studied in isolated glands from the rabbit gastric mucosa. The glands were either resting or stimulated by carbachol, histamine, or dibutyryl cyclic AMP. The effects were determined from changes in oxygen consumption and accumulation of aminopyrine. Atropine (10^{-6} M) almost totally inhibited the transient response induced by carbachol (10^{-4} M) in both measured parameters. The histamine-induced increase in respiration was inhibited when the atropine concentration was raised to 10^{-4} M. To a lesser extent, histamine-induced aminopyrine accumulation was reduced. The dibutyryl cyclic AMP-stimulated oxygen consumption was not affected by atropine. Burimamide (2.4×10^{-5} M) competitively inhibited the histamine responses, but had no effect on those of carbachol and dibutyryl cyclic AMP. Thiocyanate (10^{-2} M) inhibited the increase in oxygen consumption induced by all three secretagogues, but not to the prestimulatory level, in spite of a total abolishment of the aminopyrine accumulation. In unstimulated glands, burimamide (10^{-3} M) or atropine (10^{-4} M) did not alter the normal aminopyrine ratio (aminopyrine in intraglandular water/aminopyrine in extraglandular water) of approximately 50. This may indicate the existence of preformed acid in resting parietal cells. Thiocyanate, on the other hand, lowered the aminopyrine ratio in unstimulated glands from 46 to 2. The thiocyanate effect may be due to an inability to separate acid and base in the secreting membrane.

2786 EFFECTS OF ACETYLSALICYLATE ON ALKALINIZATION, ACID SECRETION AND ELECTROGENIC PROPERTIES IN THE ISOLATED GASTRIC MUCOSA.

(Eng.) Garner, A. (Biomedical Centre, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 99(3):281-291; 1977.

The effects of acetylsalicylate (ASA) on the *in vitro* secretory and electrical properties of *Necturus* and *Rana temporaria* gastric mucosa were studied to further examine the mechanisms by which salicylates affect gastric secretion and produce gastric damage. Metiamide was used to inhibit acid secretion for studies on fundic alkalinization in *Rana temporaria*. Submucosal application of 3 mM ASA for 30 min markedly reduced alkalinization in the antrum and the frog fundus. Following removal of ASA, there was only partial recovery of this secretion. The drug caused slight inhibition of spontaneous acid secretion in *Necturus* fundus, but not of histamine-stimulated acid secretion in the frog fundus. Following salicylate removal, the rate of acid secretion increased to a higher level than before administration in both tissues. There was a small flux of ASA across the mucosa, which was greatest in the acid secreting frog fundus (4.38 μmol/cm/min) and least in the antrum (2.19 μmol/cm/min). Exposure of the gastric mucosa to ASA was generally associated with a fall in transmucosal electric potential difference and short-circuit current, together with an increase in electrical resistance. The greater sensitivity of alkalinization to ASA may be responsible for the apparent increase in the rate of acid secretion.

2787 KINETICS OF ATROPINE INHIBITION OF PENTAGASTRIN-STIMULATED H^+, ELECTROLYTE, AND PEPSIN SECRETION IN THE DOG.

(Eng.) Hirschowitz, B. I.; Hutchison, G. A. (Dept. Medicine Univ. Alabama in Birmingham, Birmingham, AL 35294). *Am. J. Dig. Dis.* 22(2):99-107; 1977.

The effects of atropine on pentagastrin-stimulated gastric secretion of water, acid, electrolyte, and pepsin were determined by kinetic analysis of dose-response studies in five dogs with esophagostomy and gastric cannula. Dogs received seven separate doses of pentagastrin (1-6 μg/kg/hr, i.v. for 4 hr). The same series of doses was used with atropine sulfate (10 μg/kg/hr) as background. Atropine inhibited pentagastrin-stimulated secretion competitively, with a dose ratio change of 20. In a third set of studies, pentagastrin was infused alone for 4 hr (1.5 μg/kg/hr) and then with each of seven doses of atropine (0.625-40 μg/kg/hr), each dose used separately. Atropine competitively inhibited water, H^+, Cl^-, and K^+ secretion, with K_i (dose of atropine giving 50% inhibition) of 1.0 μg/kg/hr. Pepsin secretion was much more strongly inhibited than acid secretion by atropine, with a K_i of 0.27 μg/kg/hr, and the inhibition was uncompetitive. The calculated maximal inhibition of H^+ secretion by atropine was 89% and of pepsin, 95%. The shape of the response curve to pentagastrin was altered by atropine so that the peak response was delayed to the third and fourth hour of pentagastrin infusion. These studies suggest that atropine has a much more direct effect on pentagastrin-stimulated secretion than on histamine-stimulated secretion in the dog.

788 THE EFFECT OF PORCINE CALCITONIN UPON GASTRIC ACID SECRETION AND SERUM GASTRIN IN

AN. (Eng.) Pedersen, L.; Thaysen, E. H. (Aalborg
ygehus Nord, Aalborg, Denmark). *Scand J. Gastro-*
terol. 11(Suppl. 42):43-47; 1976.

e inhibitory action of porcine calcitonin on gas-
ic acid secretion was studied in three healthy men
d a 56-yr-old woman with the Zollinger-Ellison syn-
ome. Gastric acid secretion in the healthy subjects
s stimulated by pentagastrin (1 μg/kg/hr, 150 min).
lcitonin infusion (1 MRC U/kg/hr) in all subjects
used a prompt decrease in gastric acid output.
lcitonin infusion caused no changes in serum calcium
phosphate levels in any subject, although the serum
strin level increased in one of the healthy subjects.
en acid secretion was stimulated by histamine (40
/kg/hr, 150 min) in the three healthy subjects, cal-
tonin again suppressed gastric acid output, but to a
sser extent than during pentagastrin stimulation.
lcitonin may be useful in the pre- and peroperative
nagement of patients with the Zollinger-Ellison syn-
ome, and perhaps in the treatment of patients with
ife-threatening bleeding from erosive gastritis.

789 EFFECTS OF CIMETIDINE AND ATROPINE SULFATE ON GASTRIC SECRETION AND HEALING OF GAS-

RIC AND DUODENAL ULCERS IN RATS. (Eng.) Okabe,
.; Takeuchi, K.; Murata, T.; Takagi, K. (Dept.
emical Pharmacology, Univ. Tokyo, Hongo, Bunkyo,
okyo, Japan). *Eur. J. Pharmacol.* 41(2):205-208;
977.

e effects of cimetidine on gastric secretion and
lcer healing were compared to those of atropine
lfate in male Donryu rats. The intraduodenal ad-
inistration of cimetidine (50 or 100 mg/kg) in two
ivided doses after pylorus ligation inhibited gas-
ric acid secretion by 60.7% and 83.7% ($p<0.001$ in
oth cases) at the respective doses and inhibited
he pepsin output by 35.9% and 60.4% ($p<0.05$ and
<0.001, resp.). Atropine sulfate (15 mg/kg) also
ignificantly reduced acid and pepsin output (96.1%
nd 87.0%, resp.). At 12.5 mg/kg, cimetidine pro-
uced no significant reductions in acid or pepsin
utput. The administration of cimetidine by gas-
ric tube for 12 consecutive days significantly
mproved the healing index of experimentally in-
uced gastric ulcers by 17.7% at 100 mg/kg/day
$p<0.05$) and by 40.8% at 200 mg/kg/day ($p<0.01$).
he administration of the same doses for 10 consecu-
ive days improved experimental duodenal ulcers by
4.4% ($p<0.001$) and 41.6% ($p<0.01$), resp. The ad-
inistration of atropine sulfate (30 mg/kg/day) for
he same time periods did not significantly improve
he healing index of gastric ulcers, but did im-
rove the healing of duodenal ulcers by 38.8%
$p<0.001$). The results suggest that the enhance-
ent of ulcer healing by cimetidine is a result of
ts ability to suppress gastric secretion.

790 EFFECTS OF CIMETIDINE ON ADENYLATE CYCLASE ACTIVITY OF GUINEA PIG GASTRIC MUCOSA

TIMULATED BY HISTAMINE, SODIUM FLUORIDE AND 5'-
UANYLYLIMIDODIPHOSPHATE. (Eng.) Anttila, P.; Westermann, E. (Institut fur Pharmakologie der Medizinischen Hochschule Hannover, Karl Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Naunyn-Schmiedeberg's Arch. Pharmacol.* 294(2):209-211; 1976.

To investigate the mode of action of cimetidine, the modification of the stimulatory effects of histamine, sodium fluoride, and 5'-guanylylimidodiphosphate by cimetidine on the adenylate cyclase activity of guinea pig gastric mucosa was studied. The effect of cimetidine was compared with that of metiamide. Cimetidine (10^{-6}-10^{-4} M) inhibited histamine stimulated (10-100 μM) adenylate cyclase activity *in vitro* in a dose-dependent manner. NaF- and 5'-guanylylimidodiphosphate-stimulated activity was not affected by cimetidine. Cimetidine was about 10-fold more potent than metiamide in inhibiting the histamine-stimulated adenylate cyclase activity in the guinea pig gastric mucosa. The results demonstrate that the effect of cimetidine is qualitatively, but not quantitatively, similar to that of metiamide.

2791 THE EFFECT OF CIMETIDINE ON MEAL-STIMULATED GASTRIC FUNCTIONS MEASURED WITH A NEW METHOD.

(Eng.) Moberg, S.; Carlberger, G.; Gilljam, H.; Befritz, R. (St. Goran's Hosp., P.O. Box 12500, S-112 81 Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(2):145-148; 1977.

A new method for the measurement of meal-stimulated acid secretion, gastric emptying, and the amount of hydrogen ions delivered to the duodenum is presented in which bicarbonate infusion is unnecessary. This method was used to determine the effect of cimetidine on meal-stimulated gastric functions in six healthy subjects. The subjects received a 300-ml fluid test meal that did not change the pH of the stomach contents; 66 min later, a control i.v. infusion with saline was replaced with cimetidine (100 mg/hr, 30 min). Although gastric emptying was not affected by cimetidine, gastric acid secretion was markedly reduced. Determination of meal-stimulated gastric secretion may give a better physiological measure of gastric function than that of drug stimulation, and eliminating the need for bicarbonate infusion with meal-stimulated acid stimulation prevents the interference of bicarbonate with the liberation of antral gastrin. However, a limitation of the new method is that the meal must be homogeneous in the stomach, and the regurgitation of alkaline duodenal contents and back-diffusion of hydrogen ions through the stomach wall cannot be accounted for.

2792 GLUCOCORTICOID AND MINERALOCORTICOID ACTIONS ON GASTRIC SECRETION IN MAN.

(Eng.) Domschke, W.; Domschke, S.; Huber, W.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 24(1):34-37; 1977.

The effects of glucocorticoids and mineralocorticoids on gastric secretion were studied in 22 women without upper gastrointestinal disease. Twelve subjects received prednisolone (1 g/day, i.v.) for 6 consecutive days. The 10 remaining subjects received 9-alpha-fluorohydrocortisone (0.3 mg/day, p.o.) for 6 days. The 12 subjects receiving prednisolone subsequently received 9-alpha-fluorohydrocortisone for 9 days and prednisolone during days 4-9. None of the treatment regimens produced any significant changes in gastric acid, protein, or pepsin secretion. Following prednisolone treatment, the secretion of N-acetylneuraminic acid (NANA) bound to glycoproteins (5.9 ± 3.2 μmol/hr) was decreased, in comparison with the level before treatment (9.4 ± 3.7 μmol/hr). This effect was not prevented by concomitant mineralocorticoid treatment. Gastroduodenoscopy revealed no lesions attributable to drug administration. The data do not reveal any beneficial effects of mineralocorticoids in the treatment of peptic ulceration.

2793 EFFECT OF AN INHIBITOR OF PEPSIN PROTEOLYTIC ACTIVITY IN THE EXALTO-MANN-WILLIAMSON ULCER. (Eng.) Alphin, R. S.; Droppleman, D. A. (A. H. Robins Res. Lab., Dept. Pharmacology, Richmond, VA 23220). *Eur. J. Pharmacol.* 41(2):235-237; 1977.

The effect of the pepsin inhibitor, lignosulfonate, on the Exalto-Mann-Williamson ulcer model in the dog was studied. In untreated controls, the incidence of jejunal ulcers after this procedure was 92% (12/13 animals). Eight of the 12 affected animals had jejunal perforation at the time of death, which ranged from 26-46 days. Body weight losses ranged from 20-46%. Although survival time, weight loss and hemoglobin and hematocrit decreases were similar in lignosulfonate-treated (500 mg/2 hr, p.o.) dogs, only four of the nine treated animals had pathological changes in the jejunum. Two of the four had perforated ulcers. These studies demonstrate that pepsin plays an important role in the Exalto-Mann-Williamson ulcer.

2794 INHIBITION OF GASTRIC SECRETION BY COMBINED SECRETIN AND CCK AND COMBINED GLUCAGON AND CCK. (Eng.) Hendel, L.; Henriksen, F. W. (Kobenhavns Amtssygehus in Glostrup, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 42):37-39; 1976.

Because secretin, glucagon, and cholecystokinin (CCK) are likely to be released simultaneously under physiological conditions, possible interactions in their inhibitory effect on gastric secretion were investigated. After a basal period of 30 min, gastric secretion in 19 subjects was stimulated by a continuous infusion of pentagastrin (0.15, 1.0, and 6.0 μg/kg/hr) for 2 hr. After 1 hr, secretin, CCK, or a combination of the two was superimposed. In some experiments, glucagon and CCK were infused simultaneously. The inhibitory effects of secretin or CCK on gastric fluid secretion were not enhanced when the two were infused simultaneously. However, the inhibitory effect of secretin in low doses (0.5 clinical U/kg/hr) on gastric acid secretion was augmented by the simultaneous infusion of low doses of CCK (0.5 Ivy dog U/kg/hr). CCK did not augment the inhibitory effect of glucagon.

2795 LONG-TERM EFFECTS OF HIGHLY SELECTIVE VAGOTOMY (HSV) IN DOGS ON ACID AND PEPSIN SECRETION. (Eng.) Hirschowitz, B. I.; Hutchison, G. A. (Medical Center, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *Am. J. Dig. Dis.* 22(2):81-95; 1977.

Gastric acid and pepsin secretion studies before and for 40 months after fundic vagotomy (HSV) in three fistula dogs were carried out with the vagal stimula 2-deoxyglucose (2-DG), and dose responses to urecholine, histamine, and pentagastrin were determined. Initially HSV completely blocked the secretory response to 2-DG, but secretion began to recover by 5- months, and from 16 months on, secretion stabilized at 60% gastric acid and 13-17% pepsin (preoperative=100%). After HSV, the stomach was hypersensitive t urecholine, with a lower threshold and lower K_m, but unchanged V_m, while with histamine, the curves were shifted to the right, with V_m unchanged and K_m increased. With pentagastrin, there was also a small decrease in V_m. Pepsin responses to urecholine recovered and exceeded control by 16 months, but remained relatively unresponsive to histamine or pentagastrin. A cholinergic background provided by urecholine at subthreshold doses (<10 μg/kg/hr) restore both pentagastrin and histamine responses to prevagotomy levels. Gastrin release from the innervated antrum by 2-DG was greater than in controls and was atropine sensitive. The results indicate that denervation of the secretory mucosa, especially of the peptic cells, is never more than partially reversed even after 3 yr. Even though the response to vagal stimulation is partial, the mucosa remains capable normal response, i.e., there is no atropy, and the vagus is not directly trophic to the gastric fundus Moreover, vagotomy was followed by some hypersensitivity to urecholine, indicating changes in cholinergic receptors like those seen in denervated muscl cells.

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J. Pharmacol. 56(3):357P-358P; 1976.

01 INFLUENCE OF GASTRIN ON EPITHELIAL REGENERATION OF GASTRIC AND INTESTINAL MUCOSA
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UCOSE WITH AND WITHOUT ATROPINE IN GASTRIC FISTULA
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2819 PEPTIC ANASTOMOTIC ULCER INDUCED BY CONTINUOUS DUODENOGASTRIC REFLUX. (Ger.) Dahm, K.; Eichfuss, H. P.; Knipper, A. (Chirurgischen Universitatsklinik Hamburg, Martinistr. 2, D-2000 Hamburg 20, W. Germany). *Langenbecks Arch. Chir.* 343(2):133-151; 1977.

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2821 GASTRIC MUCOSAL pH AFTER SURGICAL INTERVENTIONS [Abstract]. (Eng.) Klopper, P. J. (Surgical Clinic, Wilhelmina Gasthuis, Univ. Amsterdam, Netherlands). *Eur. Surg. Res.* 8(Suppl. 2):53-54; 1976.

2822 GASTRIC PATHOLOGY AND APHAGIA FOLLOWING LATERAL HYPOTHALAMIC LESIONS IN RATS: EFFECTS OF PREOPERATIVE WEIGHT REDUCTION. (Eng.) Grijalva, C. V.; Lindholm, E.; Schallert, T.; Bicknell, E. J. (Dept. Psychology, Arizona State Univ., Tempe, AZ 85281). *J. Comp. Physiol. Psychol.* 90(6):505-519; 1976.

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2824 VAGOTOMY AND EXPERIMENTAL DUODENAL ULCERS. (Eng.) Joffe, S. N.; Ferrie, M. M. (Royal Infirmary, Glasgow, G4 OSF, Scotland). *Acta Hepatogastroenterol.* 23(6):435-440; 1976.

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2826 INVESTIGATION OF BASAL GASTRINEMIA AND PROTEIN STIMULATION IN THE COURSE OF CHENODEOXYCHOLIC ACID TREATMENT IN NORMAL SUBJECTS. (Ita.) Campa, P. P.; Tomassini, P.; De Bernardinis P.; D'Ignazio, D. (Istituto di Semeiotica Medica, L'Aquila, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(16):1252-1255; 1976.

2827 THE EFFECT OF ASPIRIN ON GASTRIC MUCOSAL CONTENT OF ENERGY-RICH PHOSPHATE BONDS--A DETERMINANT FOR ASPIRIN INDUCED GASTRIC DAMAGE [Abstract]. (Eng.) Jorgensen, T. G.; Weis-Fogh, U. S.; Olesen, H. P. (Inst. Experimental Res. in Surgery, Univ. Copenhagen, Norre Alle 71, 2100 Copenhagen O, Denmark). *Eur. Surg. Res.* 8(Suppl. 1 43; 1976.

2828 PATHOGENESIS OF DUODENAL ULCER. GASTRIC HYPERACIDITY CAUSED BY PROPIONITRILE AND CYSTEAMINE IN RATS. (Eng.) Szabo, S.; Reynolds, E. S.; Lichtenberger, L. M.; Haith, L. R., Jr.; Dzau, V. J. (Peter Bent Brigham Hosp., Boston, MA 02115). *Res. Commun. Chem. Pathol. Pharmacol.* 16(2):311-323; 1977.

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2830 GASTRIC ACID RESPONSE TO SHAM FEEDING IN THE DOG AND THE DUODENAL ULCER PATIENT. (Eng.) Olbe, L.; Knutson, U. (Sahlgren's Hosp., 41345 Goteborg, Sweden). *Acta Hepatogastroenterol* 23(6):455-458; 1976.

2831 THE EFFECT OF ANTACIDS ON STRESS-INDUCED LESIONS OF THE GASTRIC MUCOSA IN PIGLETS (Ger.) Doertenbach, J. G.; Hottenrott, C.; Busing M.; v. Gerstenbergk, L.; Ruf, W. (Chirurgische Universitatsklinik, Im Neuenheimer Feld 110, D-690 Heidelberg, W. Germany). *Munch. Med. Wochenschr.* 119(5):151-154; 1977.

832 EFFECTS OF CALCITONIN AND SECRETIN UPON STRESS ULCER INCIDENCE IN VARIOUS RAT ODELS [Abstract]. (Eng.) Schwille, P. O.; Steiner, .; Samberger, N. M.; Reitzenstein, M.; Schellerer, . (Univ. Hosp., 852 Erlangen, W. Germany). *Eur. urg. Res.* 8(Suppl. 2):57; 1976.

See also, 2681, 2682, 2684, 2693, 2733, 2743, 2768, 2779, 2780, 2991, 3001, 3006, 3009, 3139, 3140, 3141, 3172, 3203, 3206, 3225.

SECRETION AND METABOLISM

Pancreas

833 EXPERIMENTAL STUDIES ON THE SCINTIGRAPHY OF THE PANCREAS IN RATS AND DOGS BY USING SOTOPE LABELLED DYE. (Eng.) Bando, A. (Kobe Univ. ch. Medicine, Kobe, Japan). *Kobe J. Med. Sci.* 2(2):47-62; 1976.

ne use of isotope-labeled tetraiodo-dye solutions n scintigraphy of the pancreas was investigated in ats and dogs. Eight percent erythrosin B solution % EB), ^{131}I-erythrosin B (^{131}I-EB), and ^{131}I-rose engal solution (^{131}I-RB) were administered i.v., i.p., r i.m. to rats and dogs. Uptake of the solutions in ne pancreas, liver, heart, spleen, lungs, kidneys, and nyroid was observed at various intervals for a 24- r period. The effects of esberiven, a lymph flow ccelerator, and gascon, a surfactant, upon intra- eritoneally administered ^{131}I-RB were also ob- erved. Eight percent ^{131}I-EB was found to be apidly absorbed by the pancreas, creating only a odest peak after 5 min and was excreted into the uodenum within 30 min of i.v. injection. The reatest and most selective uptake of the pancreas as obtained after i.p. injection of ^{131}I-EB and ^{31}I-RB, with the intrapancreatic concentration ex- eeding the intrahepatic concentration by a factor f 5-9, and 10, resp., only 5 min after injection. urthermore, the dyes were retained in the organs or over 60 min. Intraperitoneally administered sberiven plus ^{131}I-RB significantly increased dye ptake by the pancreas (100-200%), as well as ac- elerating the rate of uptake. Gascon accelerated ye uptake and excretion more than esberiven, but ye uptake was decreased by about 50%. The pan- reatic concentrations yielded by use of ^{131}I-RB i.p.) were four to six times higher than those roduced by the present method of i.v. administra- ion of ^{75}Se-selenomethionine.

834 DISCHARGE OF NEWLY SYNTHESIZED PROTEINS IN PURE JUICE COLLECTED FROM THE HUMAN ANCREAS: INDICATION OF MORE THAN ONE POOL OF INTRA- ELLULAR DIGESTIVE ENZYMES. (Eng.) Robberecht, P.; remer, M.; Christophe, J. (Free Univ. Brussels Med- cal Sch., Waterloo Blvd. 115, B-1000 Brussels, Bel- ium). *Gastroenterology* 72(3):417-420; 1977.

he total output of pancreatic proteins in man was ompared with the secretion of newly synthesized pro- eins. The pancreatic secretion of six normal vol- nteers was collected by endoscopic cannulation of he main pancreatic duct. The appearance of newly synthesized proteins was monitored at 1-min intervals after labeling with ^{75}Se-methionine. The minimum transit time of these proteins from their site of synthesis to the acinar lumen was 36 ± 8 min. Stimulation of protein secretion by a rapid i.v. injection of cerulein (40 ng/kg) 1 hr after ^{75}Se-methionine administration, decreased the specific radioactivity of the discharged proteins by an average of 73%. These data support the concept of a functional heterogeneity of proteins secreted by the human pancreas.

2835 STUDIES ON SECRETORY GLYCOPROTEINS IN THE RAT EXOCRINE PANCREAS. I. FINE STRUCTURE OF THE GOLGI COMPLEX AND RELEASE OF FUCOSE-LABELED PROTEINS AFTER IN VIVO STIMULATION WITH CAERULEIN. (Eng.) Volkl, A.; Bieger, W.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 175(2):227-243; 1976.

The rate of synthesis and discharge of regular and fucosylated secretory proteins in isolated rat pancreatic lobules was studied under control conditions and after *in vivo* prestimulation with cerulein (2.5 x 10^{-7} g/kg/hr). Both labeled leucine and fucose were incorporated into pancreatic proteins at a linear rate, which was potentiated by *in vivo* stimulation. In pulse-chase experiments, both regular and fucosylated secretory proteins were discharged into the medium in parallel. The *in vivo* pretreatment with cerulein caused an earlier discharge and increased the total amount of protein released. Kinetic analysis of unstimulated (baseline) discharge of both classes of secretory proteins indicated a striking *in vitro* sensitivity by the previous *in vivo* treatment with cerulein. The biochemical data were compared to the fine structure of the Golgi complex under both control and prestimulated conditions. The Golgi stacks were composed of four to six individual cisternae, which in some cases were connected by intercisternal pores. Transporting vesicles were observed fusing along the total length of the outermost cisterna on both the *cis*- and *trans*-side and with the lateral ends of the intermediate cisternae. Under control conditions, only the last *trans*-cisterna contained some electron-opaque material: *in vivo* prestimulation led to distension and filling of all cisternae in an individual Golgi unit. Numerous stages of transformation of the last *trans*-cisterna into condensing vacuoles were observed, lending support to the hypothesis that during packaging of secretory products, the membranes of the Golgi complex undergo a continuous turnover.

2836 EFFECTS OF DUODENAL ALKALINIZATION ON PANCREATIC SECRETION.

(Eng.) Takeshima, T.; Adler, M.; Nacchiero, M.; Rudick, J.; Dreiling, D. A. (Medical Center, Tsukuba Univ., Japan). *Am. J. Gastroenterol.* 67(1):54-62; 1977.

To further study the feed-back effects of intraduodenal pancreatic juice or alkaline solutions on gastric and pancreatic secretion, the effects of duodenal alkalinization were evaluated in seven dogs, including two antrectomized dogs with chronic duodenal fistulas. The continuous i.v. injection of secretin plus cholecystokinin-pancreozymin (CCK-PZ) was administered as a stimulus for pancreatic secretion. The intraduodenal infusion of alkaline solutions, such as pancreatic juice (pH 8.6), bile (pH 8.1), bicarbonate solution (160 mEq/l, pH 8.6), and TRIS buffer solution (0.3 M, pH 9.5), caused a moderate increase in protein output and a modest or no increase in flow, but no change in bicarbonate output. During the infusion of pancreatic juice, varied doses of secretin (0, 0.015, 0.03, 0.06 U/kg/min), or secretin (0.03 U/kg/min) plus CCK-PZ (0.05 U/kg/min) were administered i.v. During secretin (0.03 U/kg/min) stimulation, flow increased 17.7%, which was statistically significant. Protein output also showed a significant increase of 35.7%. There was, however, no response of the pancreas to the infusion of pancreatic juice when the gland was stimulated by secretin plus CCK-PZ. Antrectomy did not alter the effect of alkaline intraduodenal infusions on pancreatic secretion. Alkalinization of the duodenum significantly increases secretin-stimulated pancreatic enzyme secretion. It is suggested that this phenomenon derives from a "CCK-PZ" effect, most likely resulting from release of duodenal gastrin by the increases in duodenal pH.

2837 NON-PARALLEL RESPONSE OF AMYLASE AND CHYMOTRYPSINOGEN BIOSYNTHESIS FOLLOWING PANCREATIC STIMULATION: A POSSIBLE EXPLANATION FOR OBSERVED NON-PARALLELISM IN PANCREATIC SECRETION.

(Eng.) Dagorn, J. C.; Paradis, D.; Morisset, J. (Unite de Recherches de Pathologie Digestive, U-31 INSERM, 46 chemin de la Gaye, Marseille F-13009, France). *Digestion* 15(2):110-120; 1977.

Pancreatic synthesis and secretion of amylase (Am) and chymotrypsinogen (ChTg) were studied in rats stimulated by gastric intubation of oleic acid. The ratio of Am to ChTg synthesis, as measured by ^{14}C-phenylalanine incorporation, showed a 65% decrease within 15 min of stimulation, followed by a gradual return to control values after 90 min. Measurements of the intrapancreatic levels of Am and ChTg showed a 33% decrease in the Am:ChTg ratio within 30 min, followed by a return to normal. The Am:ChTg ratio in the pancreatic juice decreased dramatically after oleic acid stimulation, since the ChTg output increased 15 times, while the Am output only tripled. Since the nonparallelism in rates of biosynthesis only partially accounts for the nonparallelism in rates of secretion, it is suggested that different mechanisms control these two processes.

2838 ADENYL CYCLASE AND CYCLIC AMP (cAMP) IN ACUTE EXPERIMENTAL PANCREATITIS. BIOCHEMICAL AND HISTOCHEMICAL STUDIES.

(Eng.) Gabrys-Pomykala, B. F.; Holian, O.; MacKenzie, M.; Nyhus, L. M.; Bombeck, C. T. (Abraham Lincoln Sch. Medicine, Univ. Illinois Medical Center, Chicago, IL 60612). *Am. J. Surg.* 133(2):156-162; 1977.

The relationship of adenylate cyclase and adenosine 3',5'-monophosphate levels to early events in hemorrhagic pancreatitis was studied in dogs using an experimentally induced model of the disease. Anesthetized and laparotomized dogs were given a single injection of 10 cm^3 trypsin (30,000 I.U.), 3 cm^3 bile, and 4 cm^3 blood into the caudal major pancreatic duct. Induction of pancreatitis occurs within 15 min, as indicated by visible hemorrhage and increased levels of serum amylase and lipase. Concommitantly, basal adenylate cyclase activity dropped from 3.39 ± 0.21 to 1.66 ± 0.54 pmol/mg protein/min. By 30 min, basal activity was negligible. Adenylate cyclase activity was stimulated by sodium fluoride and remained constant for 30 min, subsequently falling to background levels by 60 min. However, levels of cAMP in the tissue did not decline below a normal basal control of 0.88 ± pmol/mg wet tissue by 60 min. Histochemical studies localized adenylate cyclase of normal pancreatic tissue to the luminal membranes of capillaries and to the plasma membranes of endocrine cells, but not to the exocrine cell membranes. Progressive disappearance of adenylate cyclase activity appears to result from autodigestion of membranes by proteases released during acute cell breakdown.

2839 EFFECTS OF PARTIAL SURGICAL PANCREATECTOMY IN RATS. I. PANCREATIC REGENERATION.

(Eng.) Pearson, K. W.; Scott, D.; Torrance, B. (Manchester Royal Infirmary, Manchester, M13 9WL, England). *Gastroenterology* 72(3):469-473; 1977.

Because of limited and often conflicting reports on the effects of partial pancreatectomy in mammals, the capacity for pancreatic regeneration in male Wistar rats was determined after 50, 70, or 90% pancreatectomy. In weight-matched controls, pancreatic growth was still taking place, but ceased after 2 months. Growth of the residual pancreas in operated animals over this 2-month period was greate than that in controls, and the final weight of the residual pancreas was 21, 32, and 78% greater than that of the corresponding segments in sham-operated animals after 50, 70, and 90% resection, resp. Proliferation of acinar cells was assayed by autoradiographic detection of tritiated thymidine incorporation in controls and after 90% resection. Proliferation of acinar cells in control animals during the first 2 weeks of the experiment was significantly higher than it was later in the experiment, when it fell to very low levels. Proliferation in 90% resected animals was markedly higher than that in controls 2-5 days after resection and, together with th limited hypertrophy occurring at this time, adequately accounted for the increase in weight of the

esidual pancreas during the first 2 weeks. The in-
rease in pancreatic weight in control or resected
nimals between 2 weeks and 2 months cannot be ex-
lained, either in terms of hypertrophy or hyper-
lasia of acinar cells.

2840 FREE PROTEOLYTIC ACTIVITY IN NORMAL PANCREAS [Abstract]? (Eng.) Rinderknecht,
.; Renner, I. G. (Veterans Admin. Hosp., Sepulveda,
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2841 STUDIES ON AMINO ACID TRANSPORT IN THE RAT EXOCRINE PANCREAS [Abstract]. (Eng.) Bie-
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2842 INVESTIGATION ON THE METABOLISM OF L LEUCINE IN THE RAT EXOCRINE PANCREAS
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auduin, H. (I.R.I.B.H.N. Tracers Methodology and
harmacological Biochemistry, Free Univ. Brussels,
russels, Belgium). *Scand. J. Gastroenterol.*
1(Suppl. 41):91; 1976.

2843 STUDY OF PANCREATIC SECRETION DURING ENDOSCOPIC RETROGRADE CANNULATION [Ab-
stract]. (Eng.) Osnes, M.; Hanssen, L. E.; Myren,
J. (Ullevaal Hosp., Oslo 1, Norway). *Scand. J.
Gastroenterol.* 11(Suppl. 41):28; 1976.

2844 EFFECT OF HYPERALIMENTATION ON THE PANCREATIC AND BILIARY SECRETIONS IN THE DOG. (Fre.) Adler, M. (No affiliation given). *Rev. Fr. Gastroenterol.* (124):47; 1976.

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2850 EVALUATION OF EXOCRINE PANCREATIC FUNCTION BY STIMULATION WITH CAERULEIN (I.M.), SECRETIN-CAERULEIN (I.V. RAPID INJECTION AND INFUSION) AND SECRETIN-PANCREOZYMIN (I.V. RAPID INJECTION AND INFUSION) [Abstract]. (Eng.) Cavallini, G.; Mirachian, R.; Angelini, G.; Vantini, I.; Vaona, B.; Gelpi, F.; *et al.* (Istituto di Clinica Medica III, Universita di Padova Sede, Verona, Italy). *Scand. J. Gastroenterol.* 11(Suppl. 41):29; 1976.

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2852 CYCLIC GMP, CYCLIC AMP, ENZYME AND BICARBONATE SECRETION IN PURE PANCREATIC JUICE; DOSE-RESPONSE CURVES TO CHOLECYSTOKININ-PANCREOZYMIN IN DOGS [Abstract]. (Eng.) Singer, M. V.; Cailla, H. L.; Demol, P.; Mendes de Oliveira, J. P.; Sarles, H. (INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(Suppl. 41): 59; 1976.

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2856 PANCREATIC STIMULATION BY 2 DEOXY D GLUCOSE: A STUDY OF CENTRAL ADRENERGIC MEDIATION [Abstract]. (Eng.) Roze, C.; Maletti, M.; de La Tour, J.; Vaille, C.; Debray, C. (Hopital Bichat, 170 Bd Ney, 75877 Paris Cedex 18, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):33; 1976.

2857 IMMUNOGLOBULINS AND PANCREATIC SECRETION [Abstract]. (Eng.) Dreiling, D. A.; Soto, J. M.; Bramis, J. (Mt. Sinai Sch. Medicine, City Univ., New York, NY). *Scand. J. Gastroenterol.* 11(Suppl. 41):27; 1976.

2858 ACTION OF NONHORMONAL POLYPEPTIDES ON THE DIGESTIVE TRACT: TECHNICAL APPLICATIONS. (Fre.) Delcourt, A. (No affiliation given). *Rev. Fr. Gastroenterol.* (124):51; 1976.

2859 INHIBITION OF RAT EXOCRINE PANCREATIC FUNCTION BY A SYNTHETIC ANALOGUE OF PGE$_2$ [Abstract]. (Eng.) Dodi, G.; Santoro, G.; Jaffe, B. M. (P. Conciapelli 17, 35100 Padova, Italy). *Eur. Surg. Res.* 9(Suppl. 1):102; 1977.

2860 SECRETIN PHARMACOKINETICS AND PLASMA LEVELS FOR HALF MAXIMUM BICARBONATE RESPONSE IN MAN [Abstract]. (Eng.) Haecki, W. H.; Belohlavek, D.; Bloom, S. R.; Demling, L.; Domschke, W.; Domschke, S.; *et al.* (Hammersmith Hosp., London, England). *Gut* 17(5):393; 1976.

2861 THE LONG TERM EFFECT OF SOMATOSTATIN AND CALCITONIN ON THE EXOCRINE PANCREATIC FUNCTION IN THE UNRESTRAINED DOG [Abstract]. (Eng.) Funovics, J.; Holbing, N.; Rauhs, R.; Fuchsjager, N.; Leher, L.; Niebauer, G.; *et al.* (I Chirurgische Klinik, Alserstr. 4, 1090 Wien, Austria). *Eur. Surg. Res.* 9(Suppl. 1):164; 1977.

2862 STEROID INDUCED SECRETORY AND PATHOLOGICAL CHANGES IN RAT PANCREAS [Abstract]. (Eng.) Bourry, J.; Sarles, H.; Laugier, R. (U-31, INSERM, 46 chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):25; 1976.

2863 FEED-BACK REGULATION OF THE EXOCRINE PANCREATIC FUNCTION BY INTESTINAL TRYPSIN IN RAT AND MAN [Abstract]. (Eng.) Ihse, I.; Lilja, P.; Lundquist, I. (Dept. Surgery, Lund, Sweden). *Scand. J. Gastroenterol.* 11(Suppl. 41): 32; 1976.

See also, 2679, 2680, 2772, 2809, 2969, 2978, 2980, 3038.

SECRETION AND METABOLISM

Hepatobiliary Tract

2864 THE MIXED LEUCOCYTE-MACROPHAGE MIGRATION TEST IN ACTIVELY SENSITISED AND TRANSFER FACTOR-TREATED RHESUS MONKEYS: PRELIMINARY OBSERVATIONS ON HBsAg SPECIFIC TRANSFER FACTOR. (Eng.) Scalise, G.; Mazaheri, M. R.; Hamblin, A. S.; Gioannini, P.; Zuckerman, A. J.; Dumonde, D. C. (London Sch. Hygiene and Tropical Medicine, London, England). *Minerva Gastroenterol.* 22(3):257-260; 1976.

Studies were carried out in Rhesus monkeys to determine whether dialysable transfer factor (TF) confers cellular immune responsiveness to keyhole limpet hemocyanin (KLH), tuberculin PPD, and hepatitis B surface antigen (HBsAg) on operationally naive animals. Immunized donors and TF recipients were tested by a 48-hr skin test of delayed hypersensitivity (KLH=10 μg, PPD=10 μg, HBsAg=50 μg) and by a mixed cell migration technique. Following active sensitization with the antigens in complete Freund's adjuvant, both migration reactivity and delayed hypersensitivity was conferred to the monkeys towards the end of the third week. In contrast, when recipient monkeys were treated with TF derived from immunized animals, the TF-treated monkeys acquired migration responses, but not delayed hypersensitivity. The mixed leukocyte-macrophage migration test is suitable for studying the response of recipient animals. If it can be confirmed that TF for HBsAg works in the rhesus monkey, a useful model for hepatitis B immunotherapy will be available.

2865 THE HEPATIC HANDLING OF ^{131}I-LABELED SULFOBROMOPHTHALEIN IN THE DOG. COMPARISON WITH SULFOBROMOPHTHALEIN. (Eng.) Glasinovic, J. C.; Delage, Y.; Erlinger, S. (INSERM, Hopital Beaujon 100, Boulevard du General Leclerc, 92110 Clichy, France). *Biomedicin (Express)* 25(7):255-258; 1976.

The hepatic uptake and biliary excretion of BSP and ^{131}I-labeled BSP were compared in the dog.

one series of experiments, a compartmental alysis of BSP and ^{131}I-labeled BSP disappear- ce curves was performed after the simultaneous jection of 5 mg/kg of BSP and 10 µCi of ^{131}I- beled BSP. Both the plasma to liver and liver bile transfer rates were significantly lower r ^{131}I-labeled BSP (0.150 ± 0.030 mg/mg/min d 0.006 ± 0.002 mg/mg/min, resp.) than for P (0.282 ± 0.062 and 0.044 ± 0.016 mg/mg/min, sp., $p<0.001$). The liver to plasma rates re not significantly different. In the second ries of experiments, the hepatic uptake of BSP d ^{131}I-labeled BSP was estimated by the multiple dicator dilution technique. The extraction of SP (59% ± 5) was significantly higher than that ^{131}I-labeled BSP (35% ± 5, $p<0.001$). It is con- uded that the labeling of BSP with ^{131}I signi- cantly modifies the hepatic handling of the e; ^{131}I-BSP cannot therefore be used as a acer of BSP.

366 EFFECT OF GLYCODIHYDROFUSIDATE ON SULFO-BROMOPHTHALEIN TRANSPORT MAXIMUM IN THE MSTER. (Eng.) Delage, Y.; Dumont, M.; Erlinger, (Hopital Beaujon, 92110 Clichy, France). *Am. J. ysiol.* 231(6):1875-1878; 1976.

e effect of sodium glyco-24,25-dihydrofusidate on P transport maximum (Tm) and biliary lipid secre- on was compared to the effect of sodium tauro- olate in hamsters. Biliary phospholipid increased om a control level of 8.8 ± 2.52 to 19.18 ± 7.86 ol/min/100 g ($p<0.02$) during glycohydrofusidate fusion (1.4 µmol/min/100 g x 90 min, i.v.) and from 29 ± 1.66 to 16.72 ± 3.87 nmol/min/100 g ($p<0.01$) ring taurocholate infusion. Cholesterol secre- on was also significantly elevated by both infu- ons. These results suggest that both compounds creased the biliary secretion of micelle-forming mpounds. In contrast, only taurocholate increased P Tm into bile (from a control level of 35.60 ± 98 to 46.55 ± 7.53 nmol/min/100 g, $p<0.01$), while ycodihydro-fusidate administration decreased Tm from 39.23 ± 8.49 to 8.33 ± 2.84 nmol/min/100 g, <0.01). This suggests that the increase in BSP observed during taurocholate administration is t the result of micellar sequestration. It uld, instead, be the consequence of a specific ffect of bile salts on the dye transport system.

867 LIPOPROTEIN REGULATION OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE ACTIV- TY IN RAT LIVER CELL CULTURES. (Eng.) Breslow, J. .; Lothrop, D. A.; Clowes, A. W.; Lux, S. E. Children's Hosp. Medical Center, 300 Longwood Ave., oston, MA 02115). *J. Biol. Chem.* 252(8):2726-2733; 977.

primary cell culture technique was used to study the ffects of lipoproteins on the 3-hydroxy-3-methyl- lutaryl coenzyme A (HMG-CoA) reductase activity in prague-Dawley rat hepatocytes. Lipoproteins pre- ared from normocholesterolemic rat and human plasma, ncluding low density lipoproteins, did not inhibit epatocyte HMG-CoA reductase activity, whereas very low density lipoproteins and high density lipoproteins isolated from the same sources were stimulatory. A lipoprotein was isolated from the plasma of cholesterol-fed rats that did inhibit hepatocyte HMG-CoA reductase activity. It was mainly $d<1.019$ g/ml and had β mobility on lipoprotein electrophoresis. The lipoprotein was compared to the comparable density fraction in the normocholesterolemic rat plasma; there was no appreciable size difference by negatively stained electron micrographs. However, two important differences in chemical composition were evident: in the inhibitory lipoproteins, the percent of total apoprotein, which was in the region of M_r=35,000, was increased 1.5- to 2-fold, and there was a marked increase in cholesterol ester content. These chemical characteristics may be required for lipoproteins to regulate hepatocyte cholesterol synthesis. Primary cell culture of rat hepatocytes appears to be a useful system in which to study hepatic cholesterol metabolism.

2868 EFFECT OF ALCOHOL ON THE HEME AND PORPHYRIN SYNTHESIS: INTERACTION WITH PHENOBARBITAL AND PYRAZOLE. (Eng.) Held, H. (Medizinische Universitatsklinik Tubingen, Abteilung I, D-74 Tubingen, W. Germany). *Digestion* 15(2):136-146; 1977.

The mechanism of hepatic δ-aminolevulinic acid synthetase (ALA synthetase) induction by alcohol and the effect of alcohol on liver porphyrin synthesis and accumulation were investigated in male Sprague-Dawley rats. After a single dose of alcohol (2 g/kg, p.o.), the activity of hepatic ALA synthetase in starving rats increased two- to threefold within 3 hr. The porphyrin concentration in the livers was increased maximally by 75%. The activities of δ-aminolevulinic acid dehydratase (ALA dehydratase), microsomal monoxygenase, and cytochrome P-450 and ATP concentrations in the liver were not altered. A previous injection of pyrazole (6 µmol/kg) abolished the inducing effect of alcohol on ALA synthetase. The inducing effect of alcohol was increased by a previous injection of phenobarbital (80 mg/kg). The activity of the microsomal monoxygenase and the concentration of cytochrome P-450 were not altered by replacing the drinking water with an 8% alcohol solution. The activity of the ALA synthetase in the liver of these animals was increased three- to fourfold only when they were starved before sacrifice; in fed animals, the activity of this enzyme was in the range of the control animals. The increase of the cytochrome P-450 concentration in the liver after 80 mg phenobarbital sodium/kg was partially inhibited by alcohol. Alcohol appears to differ from other known porphyrinogenic agents. An alteration of the cytochrome P-450 concentration could not be demonstrated as the cause of the induction of the ALA synthetase. The observed porphyrinogenic effect is not caused by alcohol itself, but either by its metabolites or by the changes of the liver metabolism caused by the effect of alcohol on the NAD/NADH ratio.

2869 ELIMINATION OF VASOPRESSIN BY THE NORMAL AND THE DAMAGED LIVER: EXPERIMENTS ON UN-ANAESTHETIZED NORMAL AND THIOACETAMIDE TREATED RATS, WITH A NOTE ON THE INFLUENCE OF ETHANOL. (Eng.) Aziz, O.; Schmidt, W. (Institut fur Angewandte Physiologie der Philipps-Universitat Marburg, Lahnberge, D-3550 Marburg, W. Germany). *Pfluegers Arch.* 367(2):165-168; 1976.

The possibility that the damaged liver eliminates antidiuretic hormone (ADH) was investigated in female Wistar rats with thioacetamide-damaged livers. Arginine vasopressin was infused (16 µU/min) into the vena portae or the vena cava of unanesthetized rats in water diuresis produced by an intraduodenal infusion of tap water. The differential antidiuretic response of the same animal to the vasopressin infusions was used to calculate the extraction fraction of ADH by the liver. In normal rats, no extraction was detected. In rats in which 5% ethanol had been infused in place of tap water, the liver extracted 10% of the ADH infused into the portal vein. The thioacetamide-damaged livers extracted 60%. Disturbances of liver cell function by narcotics and substances causing liver damage may liberate ADH-destroying enzymes into the liver sinusoids.

2870 ETHANOL METABOLISM IN PERFUSED RAT LIVER AT LOW ETHANOL CONCENTRATIONS: INVOLVEMENT OF ALCOHOL DEHYDROGENASE IN THE ADAPTIVE INCREASE IN ETHANOL METABOLISM DUE TO CHRONIC PRETREATMENT WITH ETHANOL. (Eng.) Thurman, R. G.; Scholz, R. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Hoppe-Seyler's Z. Physiol. Chem.* 357(10):1443-1446; 1976.

Ethanol metabolism was studied in the perfused livers of rats pretreated for 5 weeks with 20% ethanol in the drinking water. The rate of ethanol uptake by livers perfused with 1 mM ethanol was about 50% greater in the treated donor animals than in the untreated controls, indicating that an adaptive increase in ethanol metabolism exists at low ethanol concentrations. Perfusion with 4-methylpyrazole (0.7 mM) caused a rapid inhibition of ethanol uptake in livers from both ethanol-treated and control rats. Residual ethanol uptake was less than 5% of basal values and was indistinguishable from vaporization of ethanol from the liver surface. Since an adaptive increase was observed at 1 mM ethanol, which was almost totally 4-methylpyrazole sensitive, it is concluded that alcohol dehydrogenase, and not catalase or other enzyme systems, is responsible for the adaptive increase in ethanol metabolism.

2871 EFFECT OF ETHANOL ON COLLAGEN FORMATION IN DIETARY CIRRHOSIS IN THE RAT. (Eng.) Henley, K. S.; Laughrey, E. G.; Appelman, H. D.; Flecker, K. (Medical Res. Building, Univ. Hosp., Ann Arbor, MI 48104). *Gastroenterology* 72(3):502-506; 1977.

Studies were carried out in male Sprague-Dawley rats to determine whether ethanol increases the rate of collagen deposition in the pathogenesis of dietary cirrhosis and, if so, whether this occurs as a result of increased rates of synthesis or decreased rates of collagen breakdown. Ethanol (10 or 15% in the drinking water) increased the amount of collagen in the livers of rats receiving a cirrhogenic diet (high in fat, and low in protein, choline, and vitamin B_{12}). This effect of ethanol was most striking in the animals receiving 10% ethanol. Ethanol lowered the amount of labeled proline incorporated into hydroxyproline and, therefore, into collagen. The amount of labeled hydroxyproline remaining in the liver 7 days after injection was greater in the rats receiving 10% ethanol than in the pair-fed controls. A net increase in collagen deposition attributable to ethanol was associated with a lowered rate of collagen synthesis. The main action of ethanol in increasing the rate of collagen deposition, therefore, must be inhibition of collagen breakdown.

2872 CHANGES IN HEPATIC COLLAGEN METABOLISM IN RATS PRODUCED BY CHRONIC ETHANOL FEEDING. (Eng.) Mezey, E.; Potter, J. J.; Slusser, R. J.; Abdi, W. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Lab. Invest.* 36(2):206-214; 1977.

The effect of 6 months of ethanol feeding on parameters of hepatic collagen metabolism was studied in male Wistar rats. Ethanol feeding (36.1% of diet) resulted in small increases in the fibrous and groun substance components of hepatic collagen, as measure by increases in collagen-bound hydroxyproline and hexosamine, resp. Histologically, fatty infiltratio without necrosis or fibrosis was found in the liver. The activity of collagen proline hydroxylase and the incorporation of labeled proline into collagen by liver slices were not changed by ethanol feeding. Ethanol feeding resulted in increases in the concentration of protein and DNA in the Kupffer cells, but in no changes in collagenase activity. An increase in collagen degradation was suggested, however, by t increase in the urinary excretion of hydroxyproline (108.8-188.1 µg/24 hr in controls; 177.7-275.8 µg/24 hr in ethanol-treated animals) and glycosaminoglycan (199.1-263.6 µg/24 hr in controls; 215.9-324.6 µg/24 hr in treated animals) found after 2 and 6 months of ethanol feeding, resp. This study demonstrates that fatty infiltration of rat liver after prolonged ethanol feeding is associated with increased deposition of chemically detectable collagen and evidence increased collagen degradation, although no signific changes in parameters associated with hepatic collag synthesis were found.

2873 ACCENTUATION OF ETHANOL-INDUCED FATTY LIV BY PHENOBARBITONE. (Eng.) Marsh, A. R.; Fraser, H. S.; Breckenridge, A.; Lewis, B.; Thompso G. R. (Royal Naval Hosp., Haslar, Hants., England). *Clin. Sci. Mol. Med.* 52(2):219-222; 1977.

The previous report of a protective action of pheno barbitone against ethanol-induced fatty liver was r examined. Male Wistar rats received liquid formula diets alone or supplemented with either ethanol (36 of calories) or phenobarbitone (0.5 mg/ml) or both. Plasma triglyceride concentrations were significant increased in rats given phenobarbitone alone (3,240 290 µM, $p<0.01$) or phenobarbitone plus ethanol (2,8

70 μM, $p<0.02$), but not in those given ethanol alone, ı whom there was a significant fall (730 ± 50 μM, <0.005), as compared to control rats (1,240 ± 120 μM). .asma cholesterol concentrations rose significantly ı all three test groups ($p<0.001$). Liver triglycer-le concentrations rose in rats given ethanol alone 24.2 ± 1.5 mg/g) in comparison with controls (17.8 0.6 mg/g, $p<0.005$), but not in those given phenobar-.tone alone. A striking increase in liver trigly-eride levels occurred in rats given both ethanol and ıenobarbitone (113 ± 11.2 mg/g, $p<0.001$). Parallel ıanges occurred in liver cholesterol. These findings ıpport the concept that ethanol exerts an inhibitory ffect on the secretion of very-low-density lipopro-ein. Thus, the striking increase in liver trigly-eride levels in rats given both ethanol and phenobar-.tone was presumably due to a combination of in-reased synthesis and reduced secretion of triglycer-les.

374 KINETIC STUDIES ON THE ENZYMES CONJUGATING BILE ACIDS WITH TAURINE AND GLYCINE IN VINE LIVER. (Eng.) Vessey, D. A.; Crissey, M. ; Zakim, D. (Veterans Admin. Hosp., San Francisco, 94121). *Biochem. J.* 163(1):181-183; 1977.

kperiments were carried out in bovine liver to de-ermine whether there are separate enzymes for .ycine and taurine conjugation of bile acids. ıis question was investigated by the technique of .ternative-substrate inhibition. The initial rate reaction of choloyl-coenzyme A (choloyl-CoA) .th ^{14}C-taurine was determined with ^{14}C-taurine resent at its K_m concentration (0.75 mM). Un-ıbeled glycine was added at a concentration of 2 mM, which is three times its K_m concentration ı the glycine-conjugation reaction. This concen-ration caused no inhibition of the conjugation of C-taurine. The initial rate of ^{14}C-glycine con-ıgation was unaffected by the addition to the ssay of a concentration of unlabeled taurine three imes its K_m in the taurine reaction. These data emonstrate that there are separate active sites or glycine and taurine in the conjugation reactions ıd that there are separate enzymes for the con-ıgation of cholic acid with glycine and taurine.

375 EFFECT OF DEOXYCHOLIC ACID INGESTION ON BILE ACID METABOLISM AND BILIARY LIPID SE-RETION IN NORMAL SUBJECTS. (Eng.) LaRusso, N. F.; zczepanik, P. A.; Hofmann, A. F. (Dept. Biochemicall ytology, Rockefeller Univ., New York, NY 10021). *astroenterology* 72(1):132-140; 1977.

he effect of deoxycholic acid ingestion on bile cid kinetics, biliary bile acid composition, and iliary lipid secretion was studied in seven healthy olunteers. Bile acid kinetics were measured by iso-ope dilution, and hourly outputs of bile acid, cho-esterol, and phospholipid were quantitated by a duo-enal perfusion technique during a 24-hr period that ncluded three liquid meals and an overnight fast. iliary bile acid composition was assessed by coupled as chromatography-mass spectrometry. After deoxycho-ic acid (750 mg/day, 4-8 weeks) ingestion, biliary ile acids became composed of predominantly deoxycholyl conjugates, and deoxycholic acid pools increased fourfold. Both chenodeoxycholic and cholic acid pools decreased, and daily synthesis of each of the primary bile acids was inhibited by 50%. Total bile acid pools did not change in any consistent manner. Daily bile acid secretion increased slightly during deoxycholic acid ingestion, and recycling frequency varied reciprocally with the total bile acid pool both before and during deoxycholic acid treatment. Deoxycholic acid ingestion caused no change in either the daily secretion of cholesterol or lecithin, or the cholesterol saturation of fasting-state bile, which remained unsaturated throughout the study. SGOT levels increased to 4 times the upper limits of normal in two subjects, but these levels promptly returned to normal when deoxycholate feeding was stopped. Serum cholesterol levels decreased an average of 15% in every subject during deoxycholic acid administration. The results give no evidence for a direct role of deoxycholate in the pathogenesis of cholesterol cholelithiasis.

2876 EFFECT OF DIETARY LACTOSE AT LEVELS COMPARABLE TO HUMAN CONSUMPTION ON CHOLESTEROL AND BILE ACID METABOLISM OF CONVENTIONAL AND GERMFREE RATS. (Eng.) Wostmann, B.; Bruckner-Kardoss, E.; Beaver, M.; Chang, L.; Madsen, D. (Dept. Microbiology, Univ. Notre Dame, Notre Dame, IN 46556). *J. Nutr.* 106(12):1782-1790; 1976.

The effect of lactose on the microbial modification of acid and neutral sterols was studied in rats during a 3-month feeding trial. Lactose intake, ranging up to 30% of total diet, increased β-muricholic (β-MC), but not cholic acid concentrations in conventional (CV) rat small intestine; at the 20% and 30% intake levels, the intestinal cholic:β-MC ratio approached that in germ-free (GF) rats. Total intestinal bile acid (BA) content increased by approximately one-third, but remained at less than half the value found in GF rats. At lactose intake levels within a range corresponding to the recommended consumption of dairy products for adult man (5-10%), only moderate changes in intestinal, and little change in fecal BA were found during and after the 3-month period. Intestinal β-MC was increased in the presence and in the absence of an intestinal microflora. Experiments with GF rats fed 10% lactose or 10% maltose indicated that this increase is evoked similarly by both carbohydrates. The slight increase in serum cholesterol levels seen with disaccharide feeding, which became evident only in the GF rats, was again not specific for lactose. Lactose feeding had no effect on liver cholesterol levels. Comparison of CV rats fed nonsterile and radiation-sterilized lactose-containing diets suggested that this mode of sterilization has only a minor influence on the resulting data. Sterilization of diet by irradiation with 3.5 to 4.0 x 10^6 rads was preferable to autoclaving. The data indicate that there is no major effect specifically related to a normal dietary intake of lactose on cholesterol and BA metabolism of the adult rat.

2877 SUBCELLULAR PATHOLOGY OF RAT LIVER IN CHOLESTASIS AND CHOLERESIS INDUCED BY BILE SALTS. 1. EFFECTS OF LITHOCHOLIC, 3β-HYDROXY-5-CHOLENOIC, CHOLIC, AND DEHYDROCHOLIC ACIDS. (Eng.)

Miyai, K.; Richardson, A. L.; Mayr, W.; Javitt, N. B. (San Diego Sch. Medicine, La Jolla, CA 92093). *Lab. Invest.* 36(3):249-258; 1977.

The effects of single or combined administration of sodium taurolithocholate, taurocholate, and 3β-hydroxy-5-cholenoic, and dehydrocholic acids (TLC, TC, BHC, and DHC, resp.) on bile flow and hepatic ultrastructure were studied in female Wistar rats with or without cannulation of the common bile duct. Cholestasis or choleresis was induced by the i.v. infusion of one of the bile acids (0.05 to 0.2 μmol/min/100 g). Bile flow was monitored and ultrastructural changes were examined up to 3 hr after bile salt administration. TC induced acute cholestasis and ultrastructural alterations consisting primarily of dilation of bile canaliculi, loss of canalicular microvilli, and lamellar transformation of the canalicular membrane. Occasionally, crystalline precipitates were present within the canalicular lumen and in the pericanalicular region of hepatocytes. BHC caused similar, but less severe, ultrastructural changes to those induced by TLC. DHC had a greater choleretic effect than TC, but neither induced noteworthy ultrastructural change. When infused simultaneously with TLC, TC reversed cholestasis and largely prevented development of the ultrastructural changes induced by TLC. In contrast, simultaneous infusion of DHC prevented neither cholestasis nor development of the ultrastructural changes induced by TLC, which were more striking than those caused by TLC or BHC alone. In addition, structural changes associated with cholestasis induced by these bile salts, either singly or in combination, were more pronounced and frequent in the periportal zone than elsewhere in the hepatic lobule. The results suggest that both TLC and BHC induce cholestasis by affecting the structural and functional integrity of the bile canalicular membrane and also, in part, by forming untransportable precipitates. The contrasting effects of TC and DHC on TLC-induced changes suggest that TC overcomes the effect of TLC by solubilizing it into mixed micelles, but DHC and its metabolites have little or no such effect. The intralobular variation in severity of ultrastructural changes probably reflects the accumulation of bile salts in greater concentrations in hepatocytes near the portal triads.

2878 EFFECT OF MICROSOMAL ENZYME INDUCERS ON THE BILIARY EXCRETION OF AN EXOGENOUS LOAD OF BILIRUBIN IN NEWBORN RATS. (Eng.) Klaassen, C. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Proc. Soc. Exp. Biol. Med.* 153(2):370-373; 1976.

Experiments were carried out in newborn Sprague-Dawley rats to determine whether the biliary excretion of an exogenous load of bilirubin is impaired and whether there is a difference in the ability of various microsomal enzyme inducers to enhance the development of the processes responsible for its excretion. Rats 15 days of age and younger were less efficient in excreting ^{3}H-labeled bilirubin into the bile than older rats. Rats 1, 6, 11, 16, 21, or 26 days old were pretreated for 4 days with phenobarbital (33 or 50 mg/kg), spironolactone (75 mg/kg), pregnenolone-16α-carbonitrile (PCN, 75 mg/kg), or 3-methylcholanthrene (3-MC, 20 mg/kg). On the fifth day, ^{3}H-bilirubin was administered (30 mg/kg, i.v.). Twenty minutes later, the amount of bilirubin excreted into the intestine was determined. Spironolactone and PCN enhanced the biliary excretion of bilirubin, but phenobarbital and 3-MC were without effect. The results show that the biliary excretion of exogenous unconjugated bilirubin is immature in the newborn rat.

2879 PLASMA PROTEIN SYNTHESIS BY ISOLATED RAT HEPATOCYTES. (Eng.) Crane, L. J.; Miller D. L. (Roche Inst. Molecular Biology, Nutley, NJ 07110). *J. Cell Biol.* 72(1):11-25; 1977.

A new method of preparing rat hepatocytes with extended viability was developed to study the role of hormones and other plasma components upon secretory protein synthesis. Hepatocytes maintained in minimal essential medium reduced the levels of all amino acids in the medium except the slowly catabolized amino acids leucine, isoleucine, and valine, which steadily increased as the result of liver protein catabolism. Although the liver cells catabolized 10-15% of their own protein during a 20-hr incubation, the cells continued to secrete protein in a linear fashion throughout the period. Cells from nonadrenalectomized animals showed preinduction of tyrosine amino transferase, having a high level of enzyme at the time of isolation, which showed only an increase of approximately 60% upon incubation with cortisol. In contrast, cells from adrenalectomized animals initially had a low level of enzyme, which increased fourfold over a period of 9 hr. The effects of both epinephrine and cortisol on protein synthesis were also much larger in cells from adrenalectomized animals. After a delay of several hours, cortisol increased fibrinogen synthesis sharply, so that at the end of the 20-hr incubation, cells treated with hormone secreted nearly 2.5 times as much fibrinogen as control cells The effect was found to be specific; cortisol stimulated neither albumin secretion nor intracellular protein synthesis. The combination of cortisol and epinephrine strongly depressed albumin synthesis in both types of cells. Insulin enhanced albumin and general protein synthesis, but had little effect on fibrinogen synthesis.

2880 THE ENDOPLASMIC RETICULUM OF THE RAT LIVER CELL IN EXPERIMENTAL MECHANICAL CHOLESTASIS. CORRELATED BIOCHEMICAL AND ULTRASTRUCTURAL-MORPHOMETRIC STUDIES ON STRUCTURE AND ENZYME COMPOSITION. (Eng.) Denk, H.; Eckerstorfer, R.; Rohr, H. P. (Univ. Vienna Sch. Medicine, Vienna, Austria). *Exp. Mol. Pathol.* 26(2):193-203; 1977.

The structure and enzyme composition of the endoplasmic reticulum (ER) and smooth (SER) and rough (RER) microsomal subfractions derived from choledochus-ligated rat livers were studied using biochemical and ultrastructural morphometric methods. Mechanical cholestasis resulted in an increase in the surface density of ER per total liver (4.06 ±

0.35 m^2/cm^3 of liver versus 1.95 ± 0.14 m^2/cm^3 in controls), but neither the protein/phospholipid nor the SER/RER ratios of the microsomal membranes were affected. ER in cholestasis was poor in cytochrome P-450, the P-450 loss being more pronounced in the RER than in the SER. The decrease in cytochrome b_5 was less pronounced. Microsomal UDP-glucuronyl transferase activity remained unchanged; total activity in the liver was elevated in proportion to the increase in total microsomal protein. Glucose-6-phosphatase activity was significantly decreased in SER (6.50 versus 10.59 μmol P/mg microsomal protein/20 min) and RER (6.10 versus 10.27 μmol P/mg/20 min). Benzpyrene hydroxylase activity of liver microsomes *in vitro* was greatly impaired in cholestasis (20% of the controls). In contrast to aminopyrine-*N*-demethylase, the benzpyrene hydroxylase activity did not correlate with P-450 loss or loss of P-450 reductase. This may be due to a predominant alteration of the P-450 species specifically engaged in benzpyrene metabolism. Cholestasis had no effect on microsomal lipid peroxidation and fatty acid desaturation *in vitro*. Selective ligation of the middle lobe of the liver was not accompanied by an increase in the weight of the obstructed lobe or by inhibition of microsomal aminopyrine-*N*-demethylation. However, an increase in microsomal protein, as well as a decrease in the specific microsomal content in P-450 and b_5 and in glucose-6-phosphatase activity, was observed, similar to the situation seen in complete cholestasis.

2881 EFFECT OF 3-AMINO-1,2,4-TRIAZOLE TREATMENT ON CATALASE ACTIVITY AND TRIGLYCERIDE LEVEL IN FATTY LIVER OF THE RAT.

(Eng.) Ishii, H.; Suga, T.; Niinobe, S. (Tokyo Coll. Pharmacy, 1432-1 Horinouchi, Hachioji, Tokyo 192-03, Japan). *Biochem. Pharmacol.* 26(7):625-628; 1977.

The effect of 3-amino-1,2,4-triazole (AT) pretreatment on the triglyceride (TG) level in CCl_4 (2.5 ml/kg, s.c.)-, ethanol (6 g/kg, p.o.)-, or ethionine (1 g/kg, i.p.)-induced fatty liver in Wistar rats was studied, and the relationship between liver catalase activity and TG metabolism was investigated. The intoxication by each hepatotoxin increased the liver TG level in the rats. However, when the rats were pretreated with AT (1 g/kg, i.p.), the liver TG level decreased about 50%, and the liver catalase activity was inhibited about 85%. When AT and CCl_4, were injected simultaneously, they repressed about 50% of the increase of the TG level caused by the intoxication of CCl_4. When AT alone was injected before the intoxication of ethanol, the liver catalase activity decreased by 50% of that of the ethanol group, and the increase in liver TG level was lowered by 40%. When AT was injected after ethanol, the increase in liver TG level was depressed, although there was no decrease in catalase activity. Although the serum TG level was decreased by CCl_4 treatment and increased by the ethanol treatment, AT showed no effect on these changes. These results suggest that AT acts independently on the TG level and catalase activity in the liver.

2882 CHIMPANZEE LIVERS AFTER INFECTION WITH HUMAN HEPATITIS VIRUSES A AND B: ULTRASTRUCTURAL STUDIES.

(Eng.) Schaffner, F.; Dienstag, J. L.; Purcell, R. H.; Popper, H. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Arch. Pathol. Lab. Med.* 101(3):113-117; 1977.

To determine whether hepatitis A virus and hepatitis B virus produce different hepatic lesions, liver biopsy specimens from chimpanzees experimentally infected with one of the two viruses were examined ultrastructurally. Hepatitis B was recognized by the presence of hepatitis B core particles in hepatocellular nuclei. Hepatitis A was characterized by unidentified large, dense, and more irregular heterochromatin-like particles in hepatocellular nuclei, coincidental with peak aminotransferase activities. As type A hepatitis illness became manifest in the animals, mitochondrial cristae were curled and attenuated, and clusters of endoplasmic reticulum were tightly packed. The livers in viral hepatitis B showed mainly hypertrophy of tubular smooth endoplasmic reticulum. This suggests different pathogenetic mechanisms in A and B chimpanzee viral hepatitis.

2883 EFFECT OF INSULIN AND GLUCAGON ON FULMINANT MURINE HEPATITIS.

(Eng.) Farivar, M.; Wands, J. R.; Isselbacher, K. J.; Bucher, N. L. R. (Harvard Medical Sch., Boston, MA). *N. Engl. J. Med.* 295(27):1517-1519; 1976.

The ability of insulin and glucagon to enhance liver regeneration was studied in CD mice with experimental viral hepatitis. All mice received 16 complement fixation units of a suspension of A-59 murine hepatitis virus, i.p., immediately followed by an infusion containing a mixture of electrolytes, 10% glucose, and amino acids; the experimental animals also received insulin (20 U) and glucagon (0.3 mg), either alone or in combination. The infusion of virus and nutrient mixture alone resulted in death of over 80% of the animals within 2 days, and in the remainder within 4 days. The immediate administration of glucagon and insulin combined more than doubled mean survival time ($p<0.01$) and led to complete recovery in 40% of the mice; the infusion of insulin alone had a modest effect on survival ($p<0.025$), while glucagon alone had no effect. When treatment was delayed for 24 hr, the mean survival in mice treated with both hormones was still increased ($p<0.05$), and 15% recovered. At 24 hr after infection in controls, liver damage was 4+ on a scale of 1-4+ (4+ denoting massive necrosis with greater than 90% of hepatocytes destroyed), and the mean SGOT value was 3,700 ± 690 U. In the dual hormone-treated group, liver cell necrosis was only about half as extensive as in controls, and SGOT averaged 1,820 ± 460 U. By 72-96 hr, the dual hormone-treated surviving animals showed gradual histological recovery, and in those surviving 144 hr, SGOT values and liver histology were almost normal. When ^3H-thymidine incorporation was used as an index of hepatic regeneration, infection with hepatitis caused a 10-fold reduction in DNA labeling during the first

24 hr. In the hormone-treated mice, DNA labeling rose progressively, peaking at 96 hr and returning to pre-infection levels by 144 hr. Whether the combination of these two pancreatic hormones is also beneficial in acute liver cell injury in man merits investigation.

2884 MORPHOLOGIC, BIOPHYSICAL, AND BIOCHEMICAL CONSEQUENCES OF LIGATION OF THE COMMON BILIARY DUCT IN THE DOG.

(Eng.) Carlson, E.; Zukoski, C. F.; Campbell, J.; Chvapil, M. (Arizona Medical Center, Tucson, AZ 85724). *Am. J. Pathol.* 86(2):301-320; 1977.

The common bile ducts of 32 adult mongrel dogs were ligated for 2 days to 6 weeks to simulate the pathologic conditions incurred by an obstructing stone or tumor and to study the effect of mechanical trauma on connective tissue reactivity. Sham-operated animals served as controls. Bile ducts were removed at sacrifice, and biophysical, morphologic, and biochemical parameters were measured. Bile duct ligation resulted in an immediate increase of intraductular pressure and was followed quickly by significant increases in the rate of collagen synthesis and the activity of prolyl hydroxylase. Subepithelial inflammation followed by marked increases in periductular fibrosis occurred. This fibroproliferative response was paralleled by peak levels of prolyl hydroxylase activity at 2 weeks postligation. Paradoxically, bile ducts were continuously distended throughout the ligation period, despite increased fibroplasia. Following 2 weeks of ligation, scanning electron microscopy revealed large crater-like fenestrae in ductular epithelial surfaces. This was followed by focal epithelial sloughing. The continuous distention and epithelial necrosis may be due to biliary stasis and/or subepithelial infiltration of bile through epithelial fenestrae. This hypothesis is supported by studies showing that collagen extractibility is markedly increased by the addition of bile to the homogenate.

2885 STRUCTURAL AND FUNCTIONAL CHANGES IN RAT PORTAL VEINS AFTER EXPERIMENTAL PORTAL HYPERTENSION.

(Eng.) Johansson, B. (Dept. Physiology and Biophysics, Univ. Lund, Lund, Sweden). *Acta Physiol. Scand.* 98(3): 381-383; 1976

The structural and functional response of portal veins to increased pressure in the absence of any general hypertensive disease was studied in anesthetized Sprague-Dawley rats. In rats with partial occlusion produced by tying silk ligatures around the portal vein, the portal pressures averaged 20.8 cm H_2O; in sham-operated and non-operated controls, the average portal pressure was 10.4 cm H_2O. Portal vein preparations from the hypertensive animals contracted at lower frequencies or were devoid of spontaneous activity; in controls the pattern of spontaneous activity was 2-4 phasic contractions/min. The preparations from hypertensive animals were less responsive to noradrenalin, corresponding to a mean change in ED_{50} from about 4.0×10^{-7} to 6.9×10^{-7} M. The optimal length for active force development in a length-tension study corresponded to a preload of about 5 mN in both control and hypertensive preparations. However, the maximal contractile force elicited by noradrenalin at the optimal lengths was 22.5 ± 2.9 mN in seven hypertensive veins, compared to 11.2 ± 1.0 mN in the controls. Also, the hypertensive vessels showed greater maximal contractions to noradrenalin than their sham-operated controls. The hypertensive vessel was markedly dilatated, and the wall thickness was increased in comparison with controls. This study reveals a rapid structural response of the portal vein to increased pressure load associated with changes in responsiveness and contractility of the smooth muscle.

2886 INDUCTION OF PINOCYTOSIS IN RAT HEPATOCYTES BY PARTIAL HEPATECTOMY.

(Eng.) Mori, M.; Novikoff, A. B. (Sapporo Medical Coll., Sapporo, 060, Japan). *J. Cell Biol.* 72(3):695-706; 1977.

The induction of pinocytosis in rat hepatocytes by 2/3-hepatectomy was investigated. Droplets of up to 20 µm in diameter developed initially by addition to smaller pinocytic structures, and later by fusion with lysosomes. The droplets contained a material with an electron microscopic periodicity characteristic of fibrin, and they were PAS-positive, as is plasma. Plasma glycoproteins are considered to be major components of the droplets. The droplets were membrane delimited, as seen after perfusion fixation. The droplets were positive for three lysosomal hydrolases identified cytochemically: acid phosphatase, *N*-acetyl-β-glucosaminidase, and β-glucuronidase. Light and electron microscopy showed that these activities were acquired by fusion with lysosomes, mostly autophagic vacuoles and residual bodies, both of which became numerous after partial hepatectomy. Pinocytic structures were frequently seen afte partial hepatectomy, although they were rare in norma liver. They were most easily observed if horseradis peroxidase (HRP) was injected i.v. before sacrifice and sections were incubated for HRP cytochemistry. The low dose of HRP employed (10 mg/100 g) did not induce pinocytosis in controls, either in untreated rats or rats subjected to laparotomy, including palpation of the liver. In partially hepatectomized rats, even a much smaller dose of i.v. HRP (3.3 mg/100 g) visualized the pinocytic structures in hepatocytes (coated vesicles, channels, cuplike bodies, and droplets). Kupffer cells pinocytosed much HRP in both control and partially hepatectomized rats.

2887 BILIARY FUNCTION AFTER LIVER TRANSPLANTATION.

(Eng.) Daloze, P.; Fourtanier, G.; Beaudouin, M.; Corman, J.; Smeesters, C.; Saric, J. (Hopital Notre-Dame, 1560 E. Sherbrooke St., Montrea H2L 4K8, Canada). *Transplant. Proc.* 9(1):309-312; 1977.

e effects of immunosuppression, liver isolation,
nervation, and immunologic attack on biliary
nction were studied in dogs following experimental
ver transplantation. Controls underwent laparo-
my only. Four other groups of dogs underwent the
llowing procedures: laparotomy plus immunosup-
ession (azathioprine, 3 mg/kg, reduced to 1 mg/kg
ter the first day; prednisolone, 1 mg/kg, reduced
0.5 mg/kg), autotransplantation, homotransplan-
tion, or homotransplantation plus immunosuppres-
on. Thirty of 49 dogs survived one of these pro-
dures for more than 3 days. Of these animals,
e mean survival among the animals in the respec-
ve groups was 12.1, 12.3, 14.2, 7.2, and 10.7
ys. In the first three groups, maximal survival
s arbitrarily limited to 15 days. In the last two
oups, no animal survived longer than 14 days. Im-
nosuppression alone did not affect bile salt secre-
on, bile flow, or bile salts. The surgical mani-
lations of either auto- or homotransplantation had
ly a slight effect on bile secretion. These alter-
ions disappeared after operation for the auto-
ansplanted recipients, which seems to rule out
ver denervation as the cause of early changes.
jection was accompanied by a severe deterioration
biliary secretion, but was less in immunosup-
essed recipients.

88 CORRECTION OF HYPERBILIRUBINEMIA IN THE GLUCURONYLTRANSFERASE-DEFICIENT RAT BY TRAPORTAL HEPATOCYTE TRANSPLANTATION.

(Eng.)
oth, C. G.; Arborgh, B.; Bjorken, C.; Sundberg,
; Lundgren, G. (Huddinge Hosp., Stockholm, Sweden).
ansplant. Proc. 9(1):313-316; 1977.

olated hepatocytes from normal Wistar rats were
ansplanted intraportally and i.m. in hyperbili-
binemic, uridine diphosphate-glucuronyltrans-
rase-deficient Gunn rats. The rats received
ther 25-35 x 10^6 hepatocytes intraportally or
x 10^6 cells i.m. Postoperatively, the re-
pients received cyclophosphamide (5 mg/kg/day).
o groups of Gunn rats received Wistar hepatocytes
traportally. In the first group, 13 of 18 sur-
ved; the other 5 died within 5 days with
vere liver damage and extensive necrosis. Ten
ys after transplantation, the average bilirubin
the surviving animals had decreased to 79% of
e preoperative value. In the second group, all
animals survived. After 10 days, the average
lirubin had decreased to 76%, and at 28 days, the
vel had dropped to 66% of the initial value. The
rum bilirubin decreased in all but one of the
imals. In hepatic specimens obtained from animals
crificed 10 days after transplantation, aggregates
well-preserved hepatocytes were found in the
stal portal branches and in the sinusoids in 9 of
livers. In most instances, the hepatic tissue
rrounding the intravascular cell plugs was morpho-
gically intact. Six of seven control Gunn rats
at had received intraportal injections of hepato-
tes from other Gunn rats survived, and the serum
lirubin remained unchanged at 10 and 28 days after
ansplantation. Five of six Gunn rats that had
ceived Wistar hepatocytes i.m. survived. Serum
lirubin was not reduced, despite morphological evidence of excellent engraftment. It appears that normal Wistar rat hepatocytes injected intraportally into uridine diphosphate-glucuronyltransferase-deficient Gunn rats serve as a source of the missing enzyme.

2889 ELEVEN AND TWO-THIRDS YEARS' SURVIVAL AFTER CANINE ORTHOTOPIC LIVER TRANSPLANTATION.

(Eng.) Starzl, T. E.; Porter, K. A.; Putnam, C. W. (Univ. Colorado Medical Center, Denver, CO 80262). *Transplantation* 23(2):168-171; 1977.

The autopsy findings of a mongrel dog that survived 11 yr and 8 months after orthotopic liver transplantation are presented. Immunosuppression with azathioprine had been discontinued 120 days after transplantation, and the dog remained well until 1 or 2 days before its death at age 14 yr. The immediate cause of death was congestive heart failure, but a potentially lethal biliary duct complication was present, which would have independently caused death within a short time. The reconstructed vena cava above and below the liver and the portal vein were normal. To arterialize the liver, a segment of donor aorta in continuity with the hepatic artery had been anastomosed to the infrarenal recipient aorta. Although the hepatic artery was grossly normal, the homograft aorta had extensive calcified atherosclerosis. Biliary reconstruction was with cholecystoduodenostomy after ligation of the distal common duct. The gallbladder, the common duct, and all the intrahepatic ducts were filled with stones or else with a soft, green or orange sludge. Stone analysis revealed predominantly bilirubin. Histopathological evaluation of the homograft revealed portal fibrosis and linking of the enlarged portal tracts to one another by connective tissue septa. There was concentric scarring around the interlobular and septal bile ducts and proliferation of ductules at the margins of the portal tracts. Many of the larger bile ducts were dilated and filled with inspissated bile. The changes were typical of chronic large duct biliary obstruction, emphasizing that the reconstructed biliary duct system is the weak point of liver transplantation. There was no evidence of liver rejection.

2890 SERUM AND BILE MODIFICATIONS IN THE GUINEA-PIG FOLLOWING CHRONIC TREATMENT WITH PGE_1 AND PGE_2.

(Eng.) Rodrigo, L. R.; Pozo, F.; Marin, B.; Schiaffini, O. (Dept. Physiology, Univ. Oviedo, Spain). *Experientia* 32(12):1604-1605; 1976.

The effects of chronic prostaglandin E_1 and E_2 (PGE_1 and PGE_2) treatment were studied in the serum and bile of guinea pigs. The animals received i.p. injections of prostaglandins (0.1 μg) on alternate days for 2 weeks. PGE_1 increased the mean serum cholesterol level (62.25 ± 3.49 mg/100 ml versus 46.15 ± 2.91 mg/100 ml in controls, $p<0.01$), but did not change the bile cholesterol or serum lipid levels. PGE_2 decreased the mean serum cholesterol level to 42.85 ± 2.67 mg/100 ml and increased the mean serum lipid level from 393.25 ± 20.36 to 623.00 ± 32.17 mg/100 ml ($p<0.01$). The biliary lipid level was decreased from 382.50 ± 27.32 mg/100 ml to 193.25 ± 18.23 mg/100 ml by PGE_1 treatment

($p<0.01$). The bile volume was decreased from a control level of 3.89 $\pm$ 0.13 ml to 2.89 $\pm$ 0.24 ml by PGE_1 and to 2.90 $\pm$ 0.10 ml by PGE_2 ($p<0.01$).

2891 ELECTRON MICROSCOPIC EVIDENCE FOR A MUSCLE LAYER IN THE WALL OF THE TERMINAL HEPATIC VENULE IN THE RAT. (Eng.) Sasse, D.; Staubesand, J. (Anatomisches Institut, 78 Freiburg, Albertstrasse 17, W. Germany). *Cell Tissue Res.* 165(3):391-396; 1976.

2892 ALTERATIONS IN BIOSYNTHETIC FUNCTIONS OF THE LIVER FOLLOWING SKIN BURNS [Abstract]. (Eng.) Scherer, Y. D.; Biebuyck, J. F. (Shriner Burns Inst., Boston, MA 02114). *Fed. Proc.* 35(3): 402; 1976.

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2895 ORIGIN OF MACROPHAGES APPEARING DURING HEPATIC REGENERATION FOLLOWING PARTIAL HEPATECTOMY IN THE RAT. (Fre.) Maes, J. M. (Institut de Morphologie, Vrije Universiteit Brussels, rue Evers, 2, 1000 Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9(Suppl. 4):343-344; 1976.

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2897 EVALUATION OF THE INCREASED BRAIN SENSITIVITY TO SEDATIVES IN PATIENTS WITH PORTACAVAL ENCEPHALOPATHY. STUDIES IN RATS WITH PORTACAVAL ANASTOMOSIS. (Fre.) Bircher, J.; Kupfer, A. (Institut de Pharmacologie Clinique, Universite de Berne, Murtenstrasse 35, CH-3010 Berne, Switzerland). *Biol. Gastroenterol. (Paris)* 9(Suppl. 4):335-336; 1976.

2898 OBSTRUCTIVE JAUNDICE IN A PATIENT WITH EPIDERMOID CARCINOMA OF THE HYPOPHARYNX. (Eng.) Edited by Philip E. Cryer and John Kissane. (Washington Univ. Sch. Medicine, Washington, DC). *Am. J. Med.* 60(5):687-695; 1976.

2899 A QUANTITATIVE ASSESSMENT OF THE STRUCTURAL CHANGES IN THE RAT'S LIVER FOLLOWING OBSTRUCTION OF THE COMMON BILE DUCT. (Eng.) Johnstone, J. M. S.; Lee, E. G. (Radcliffe Infirmar
Oxford, England). *Br. J. Exp. Pathol.* 57(1):85-94; 1976.

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Biochem. Soc. Trans. 4(2):205-209; 1976.

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URATES AND MICROSOMAL ENZYME INDUCTION IN RAT
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imon, F. R.; Sutherland, E.; Cersonsky, J.; Acca-
ino, L. (Univ. Colorado Medical Center, Denver,
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DRATE METABOLISM IN DEVELOPING RAT LIVER.
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unchen 2, W. Germany). *Eur. J. Pediatr.* 122(4):
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See also, 2676, 2678, 2773, 2775, 2844, 2851, 2975, 2983, 3087, 3221, 3359, 3496.

Intestine

2960 CIRCADIAN RHYTHM OF GLYCOGEN IN THE SMOOTH MUSCLE OF THE LARGE INTESTINE OF FED AND STARVED IMMATURE RATS. (Eng.) Hoopes, P. C.; Bo, W. J.; Krueger, W. A. (Bowman Gray Sch. Medicine, Wake Forest Univ., Winston-Salem, NC 27103). *Nutr. Rep. Int.* 14(5):521-525; 1976.

The glycogen concentration in the smooth muscle of the rat large intestine was investigated at 3-hr intervals over a 24-hr period. The animals were either allowed food *ad libitum* or starved 36 hr prior to autopsy. For fed rats, the peak glycogen concentration (1.02 ± 0.08 μg/mg) occurred at 2400 hr, while the low value (0.52 ± 0.06 μg/mg) was observed at 1500 hr. The difference between low and high points represented an increase of 96%. In rats starved for 36 hr, the peak glycogen concentration (1.54 ± 0.17 μg/mg) occurred at 0600 hr and a low (0.55 ± 0.10 μg/mg) appeared at 2400 hr. The increase between low and high points for starved rats was 180%. The data indicate that a circadian rhythm is present in the rat large intestine, which continues under conditions of starvation, although an apparent phase shift takes place.

2961 STIMULATION OF SODIUM AND WATER SECRETION WITHOUT INHIBITION OF GLUCOSE ABSORPTION IN THE RAT JEJUNUM BY VASOACTIVE INTESTINAL PEPTIDE (VIP). (Eng.) Coupar, I. M. (Dept. Pharmacology, Monash Univ., Wellington Rd., Clayton 3168, Victoria, Australia). *Clin. Exp. Pharmacol. Physiol.* 3(6):615-618; 1976.

The potency of vasoactive intestinal peptide (VIP) as a stimulant of small intestinal fluid secretion was estimated *in vivo* in the rabbit, and its possible ability to inhibit active glucose absorption was tested. VIP was slowly infused (0.035 ml/min) into the superior mesenteric artery for 30 min, and the jejunal lumen was perfused during the last 20 min with a solution containing 154 Na$^+$, 154 Cl$^-$, 5.5 D(+)-glucose, and phenosulphonphthalein. Glucose absorption and the perfusion pressure in the superior mesenteric artery were not significantly altered by the infusion of VIP. However, the infusion did produce a large net secretion of Na$^+$ and water into the lumen of the jejunum. During a control infusion with saline into the arterial blood, the jejunum absorbed a net amount of Na$^+$ and water (mean, +8.3 μmol/g/20 min and +10.9 mmol/g/20 min); when VIP (4 x 10^{-11} μmol/min) was infused, this was changed to a net secretion (-54.8 μmol/g/20 min for Na$^+$, -21.3 mmol/g/20 min for water). Increasing the infusion rate to 2 x 10^{-10} μmol/min resulted in an increased secretion rate of -87.8 μmol/g/20 min Na$^+$ and -33.9 mmol/g/20 min water. This study confirms that continuous infusion of VIP does not significantly affect the mesenteric vascular bed of the rat, as in the dog, although the amounts infused were biologically activ and caused a large fluid secretion into the lumen. This is the first demonstration of fluid secretion produced by VIP in the rat.

2962 TRANSMISSIBLE GASTROENTERITIS: SODIUM TRANSPORT AND THE INTESTINAL EPITHELIUM DURING THE COURSE OF VIRAL ENTERITIS. (Eng.) Kerzner, B.; Kelly, M. H.; Gall, D. G.; Butler, D. G Hamilton, J. R. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *Gastroente ology* 72(3):457-461; 1977.

Sodium transport, mucosal structure, and epithelial zymes were studied in the jejunum of piglets killed 25, 40, 72, or 144 hr after infection with a standa dose of transmissible gastroenteritis virus, to obtain information on the stage of epithelial differentiation. Glucose-stimulated Na transport measured in short-circuited jejunal epithelium and suspensio of villous enterocytes became progressively more abnormal during the first 40 hr, but recovered completely by 144 hr. As Na transport deteriorated, jejunal mucosal villi shortened and crypts deepened. Cells isolated from the villi became more crypt-lik in their enzyme profile, with high levels of thymidine kinase and low levels of sucrase activity 40 h after infection. At 40 hr, when diarrhea is severe, little if any virus was found in the epithelium. These data suggest that the relatively undifferentiated crypt type enterocytes on the villi constitute an important determinant of altered Na transport an diarrhea in this invasive viral enteritis.

2963 EFFECT OF INTESTINAL DISTENTION ON LEVELS OF CYCLIC AMP AND FLUID SECRETION. (Eng. Turjman, N.; Yardley, J. H.; Hendrix, T. R.; Gotter G. S. (Johns Hopkins Univ. Sch. Medicine, 725 N. Wolfe St., Baltimore, MD 21205). *Johns Hopkins Me J.* 140(3):97-99; 1977.

Studies were carried out in loops of rabbit jejunum to determine whether an increase in intestinal cyclic AMP accompanies increased intestinal secretion induced by intestinal distension. Increased secretion was seen only when the *in vivo* loops were fully distended, when peristalsis was obliterated. Cyclic AMP levels were not significantly changed, compared with control loops. Histologic examination of the distended loops showed no significant changes from normal. The data indicate that the secretion in response to distension can occur in the absence of morphological alteration and is not mediated by the elevation of intestinal cyclic AMP.

2964 STIMULATION OF ENZYME, PROTEIN, AND DNA OUTPUT FROM A JEJUNAL FISTULA IN THE RAT.

(Eng.) Schneeman, B. O.; Nasset, E. S. (Children's Hosp. Medical Center Northern California, Fifty-First and Grove St., Oakland, CA 94609). *Proc. Soc. Exp. Biol. Med.* 154(2):250-253; 1977.

A new technique for preparing intestinal fistulae in rats is presented. Perfusion of the fistula is facilitated by inserting small-diameter tubing into the closed orad end of the fistula. The distal end protrudes 0.5 cm through the belly wall for quantitative collection of perfusate or secretion. Continuity of the gut is reestablished by a side-to-side anastomosis. Analysis of the mucosa from the fistula and from the intact intestine demonstrated that the mucosae were comparable during the week the animals were used for perfusion experiments. The duodenal infusion of raw egg white stimulated the output of protein, DNA, peptidase, and alkaline phosphatase activity in the jejunal fistula perfusate. The jejunal fistula described allows easy perfusion of the lumen and quantitative collection of the perfusate.

2965 EFFECT OF 50% DISTAL SMALL BOWEL RESECTION ON GASTRIC EMPTYING IN RHESUS MONKEYS.

(Eng.) Hall, A. W.; Moossa, A. R.; Skinner, D. B. (Pritzker Sch. Medicine, Univ. Chicago, 950 East 59th St., Chicago, IL 60637). *Ann. Surg.* 185(2):214-218; 1977.

The effect of 50% bowel resection on gastric emptying was studied in eight male Rhesus monkeys. Gastric evacuation was characterized by a modified double sampling test meal, after which 50% distal small bowel resection was performed. Gastric emptying was again studied at 6 weeks and 6 months. The rate constant fell from -0.00289 ± 0.000467 to -0.00232 ± 0.00106 during the early phase, but rose to -0.00308 ± 0.00186 by 6 months, neither value being statistically different from the preoperative values. The time taken for the intragastric contents to fall to 10 ml ($T_{\frac{1}{2}}$=half life of a meal in the stomach) rose from 125.2 ± 19.2 min to 367 ± 173.4 min by 6 weeks and to 380.9 ± 161.6 min by the end of the experiments. Corresponding values for $T_{\frac{1}{2}}$ were: control period 425.8 ± 63.2 min, early phase 1,223 ± 589 min, and late phase 1,245.9 ± 529.6 min. None of these changes were statistically significant. Alterations in emptying time within each animal were consistent at the two postoperative phases. Although the two animals showing acceleration of evacuation were those with least change in secretion, compensation for the observed increase in output of gastric juice did not alter the results. The results show no specific effect of 50% enterectomy on gastric emptying.

2966 CONSEQUENCES OF PARTIAL AND SUBTOTAL COLECTOMY IN THE RAT.

(Eng.) Masesa, P. C.; Forrester, J. M. (Univ. Dar es Salaam, P.O. Box 20693, Dar es Salaam, Tanzania). *Gut* 18(1):37-44; 1977.

The effects of partial and subtotal colectomy in male Wistar rats were investigated by comparing rats subjected to right hemicolectomy, left hemicolectomy, subtotal colectomy, or colon bypass with control "operated" and unoperated "normal" rats. Hemicolectomy did not alter food intake, and body weight began to increase normally 1 week after the operation. Right hemicolectomy did result in a 37% increase in fecal weight. Propulsion activity from the small intestine was definitely poorer after right hemicolectomy, and significant compensatory growth was observed in the distal colon and small intestine. Three months after operation, growth in the small intestine was predominantly mucosal, and enterocyte density increased throughout, while villous height increased in the proximal segment ($p<0.05$). Similar changes were not observed after left hemicolectomy. Subtotal colectomy and colon bypass resulted in a 30-40% increase in food consumption and a 60% increase in fecal dry weight (at 3 months) over controls. Poor absorption was indicated by large amounts of energy excreted, despite higher food intake. Proper absorption may have been partially disrupted by a decrease in the stomach-to-anus transit time. Increased villous height, as well as significant growth of the mucosae in the upper two thirds, and of the seromucosal coat in the lower third of the small intestine, as also observed after subtotal colectomy and colon bypass. Pair feeding with control rats eliminated the increase in food intake, but not the increase in weight of the small intestine. Decreased coprophagy and absorption may have been partially responsible for the increase in food intake after subtotal colectomy. However, increased weight of the small intestine observed after both right hemicolectomy and subtotal colectomy was not always concurrent with increased food intake, and did not even require actual colectomy.

2967 THE PHYSIOLOGY OF INTESTINAL DIGESTION.

(Eng.) Shlygin, G. K. (USSR Acad. Medical Sciences, Moscow, USSR). *Prog. Food Nutr. Sci.* 2(6):249-306; 1977.

2968 EFFECT OF PHYSIOLOGICALLY ACTIVE SUBSTANCES ON INTESTINAL RESORPTION.

(Rus.) Faitelberg, R. O.; Balan, N. N. (State Univ., Odessa, USSR). *Fiziol. Zh. SSSR* 62(6):918-927; 1976.

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2970 REGULATION OF MUCOSAL GROWTH BY SINGLE AMINO ACIDS [Abstract]. (Eng.) Spector, M. H.; Traylor, J. B.; Young, E. A.; Weser, E. (Univ. Texas Health Science Center, San Antonio, TX). *Clin. Res.* 25(1):19A; 1977.

2971 ENTEROCYTE TURNOVER AND CONTENT IN FAT FED HAMSTERS [Abstract]. (Eng.) Mansbach, C. M., II (Veterans Admin. Hosp., Durham, NC). *Clin. Res.* 25(1):18A; 1977.

2972 CONTRIBUTION OF LUMINAL CONCENTRATION OF NUTRIENTS AND OSMOLALITY TO POSTPRANDIAL INTESTINAL HYPEREMIA IN DOGS. (Eng.) Kvietys, P. R.; Pittman, R. P.; Chou, C. C. (Dept. Physiology, Michigan State Univ., East Lansing, MI 48824). *Proc. Soc. Exp. Biol. Med.* 152(4):659-663; 1976.

2973 THE ROLE OF THE GUT IN THE METABOLISM OF STRONG ANALGESICS. (Eng.) Rance, M. J.; Shillingford, J. S. (Dept. Drug Metabolism, Rockitt, Colman, Dansom Lane, Kingston-upon-Hull HU 8 7 DS, England). *Biochem. Pharmacol.* 25(6):735-741; 1976.

2974 THE EFFECT OF CALCIUM ON CALCIUM BINDING PROTEIN INDUCTION IN VITRO [Abstract]. (Eng.) Golub, E. E.; Reid, M.; Bossak, C.; Wolpert, L.; Bronner, F. (Univ. Connecticut Health Center, Farmington, CT 06032). *Fed. Proc.* 36(3):456; 1977.

2975 REGULATION OF CANINE INTESTINAL CHOLESTEROL SYNTHESIS IN VITRO. (Eng.) Gebhard, R. L.; Cooper, A. D. (Stanford Univ., Stanford, CA). *Clin. Res.* 25(2):109A; 1977.

2976 EFFECT OF SUCROSE INDUCED HYPERLIPIDEMIA UPON INTESTINAL LIPOPROTEIN PRODUCTION IN THE RAT [Abstract]. (Eng.) Kelly, T. J.; Wu, A. L.; Clark, S. B.; Holt, P. R. (St. Luke's Hosp. Center, New York, NY). *Clin. Res.* 25(1):17A; 1977.

2977 EXTRANEURONAL UPTAKE AND METABOLISM OF [^{3}H]L-NOREPINEPHRINE BY THE RAT DUODENAL MUCOSA. (Eng.) Landsberg, L. (Harvard Medical Sch., Boston, MA). *Biochem. Pharmacol.* 25(6):729-731; 1976.

2978 EFFECT OF CHOLINERGIC STIMULATION AND ATROPINE ON pH THRESHOLD FOR SECRETIN RELEASE [Abstract]. (Eng.) Henriksen, F. W.; Halse, C.; Holm-Bentzen, M. (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 41):17; 1976.

2979 THE INFLUENCE OF THYROID HORMONE ON SMALL INTESTINAL LACTASE, INVERTASE AND MALTASE LEVELS IN THE RAT. (Por.) Brasil, M. do R. L.; Collares, E. F.; Soares, F. C. (Hospital das Clinica Rua Bernardino de Campos, 1000--14100 Ribeirao Preto, Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(3):197-204; 1976.

2980 EFFECTS OF PANCREATIC DUCT LIGATION ON THE SECRETORY PROCESSES OF THE HAMSTER INTESTINAL MUCOSA [Abstract]. (Eng.) Senegas, F.; Balas, D.; Frexinos, J.; Ribet, A. (U-151 INSERM, CHU Rangueil, 31400 Toulouse, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):44; 1976.

2981 JEJUNO-ILEAL BYPASS IN THE TREATMENT OF EXPERIMENTAL OBESITY IN THE RAT. (Ita.) Baggio, E.; Armellini, F.; Bosello, O.; Faccioli, G.; Magagnotto, S.; Ottolenghi, A. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinic Universita di Padova, Italy). *Chir. Patol. Sper.* 24(2):105-110; 1976.

See also, 2698, 2714, 2715, 2723, 2724, 2725, 2758, 2858, 2989, 3014, 3017, 3227.

GENERAL

2982 PREDICTION OF INTESTINAL VIABILITY BY INTRA-ARTERIAL DYE INJECTION: A SIMPLE TEST. (Eng.) Papachristou, D.; Fortner, J. G. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Am. J. Surg.* 132(5):572-574; 1976.

Preliminary data on a simple test for intestinal vi bility by intra-arterial dye injection is presented In adult Fischer rats, a 4-cm segment of terminal ileum was ligated for less than 2 hr, for 2-4 hr, o for 5-8 hr. At revascularization, the viability wa predicted in three different ways: on clinical

ounds (i.e., return of motility, color, pulsations),
measuring the temperature difference between the
timesenteric border of the loop and the adjacent
althy intestine (using an electronic thermometer
obe) to predict reactive hyperemia (if the loop
mperature was at least 1 C higher than that of the
rmal bowel), and by the dye injection method. In
e latter technique, 1-2 ml of a 0.4% saline solution
trypan blue is injected into the superior mesen-
ric artery. The dye stains normal intestine and
able parts of the previously ischemic loop, but
t nonviable areas. The accuracy of the three me-
ods in viability prediction was 36%, 69%, and 84%,
sp., for the three techniques. Two patterns of
chemia were detected by the trypan blue test. With
e, the whole ischemic loop or large areas of bowel
mained unstained. In the second type, only small
ots of the loop remained unstained; perforations
bsequently occurred at exactly the same positions.
e intra-arterial dye injection technique is a simple,
sy, and inexpensive way to accurately predict the
ability of ischemic intestine, and it appears to be
inically useful.

33 DYNAMICS OF THE ENTEROHEPATIC CIRCULATION
OF THE GLYCINE CONJUGATES OF CHOLIC, CHENO-
OXYCHOLIC, DEOXYCHOLIC, AND SULFOLITHOCHOLIC ACID
MAN. (Eng.) Hepner, G. W.; Demers, L. M. (Har-
r General Hosp., 1000 West Carson St., Torrance,
90509). *Gastroenterology* 72(3):499-501; 1977.

e kinetics of the enterohepatic circulation of con-
gated bile acids were studied in eight healthy sub-
cts, using sensitive and specific radioimmunoassays.
nous blood samples were collected over a 32-hr per-
d, during which time the subjects ate three meals
heese sandwich and milk). Serum levels of cholyl-
ycine and chenodeoxycholylglycine rose after each
al, and reached their maximum level within 30-60 min.
second chenodeoxycholylglycine peak occurred 2-3 hr
ter the first two meals in all subjects; a second
ak was also seen for cholylyglycine in three subjects.
rum deoxycholylglycine levels also rose postprandial-
; the peak level generally occurred 30 min later than
at of cholylglycine. Serum sulfolithocholylglycine
vels did not alter significantly after meals. The
ta indicate that the dynamics of the enterohepatic
rculation of individual serum bile acids differ both
antitatively and qualitatively.

34 PHARMACOKINETICS OF MOTILIN IN MAN. (Eng.)
Mitznegg, P.; Bloom, S. R.; Domschke, W.;
schke, S.; Wuensch, E.; Demling, L. (Dept.
armacology, Univ. Erlangen-Nuremberg, Universitats-
rasse 22, D-852 Erlangen, W. Germany). *Gastro-
terology* 72(3):413-416; 1977.

e physiologic role of motilin was studied in man.
nthetic 13-norleucine-motilin (0.6 and 2.4 pmol/
/min over 60 min) was infused into six healthy
lunteers, and plasma motilin was measured by radio-
munoassay. During the infusions, mean plasma
vels of 124.8 ± 14.8 and 360 ± 19.6 pmol/l,
sp., were achieved for the 0.6 and 2.4 pmol/kg/
n-doses. Disappearance half-time on stopping the
infusion was 4.36 min. The apparent volume of distribution was calculated to be 49.4 ± 3.3 ml/kg, and the metabolic clearance rate was 7.8 ± 0.5 ml/kg/min. To measure the decay of endogenous motilin, somatostatin was used in the same six subjects. A bolus of 100 μg and a subsequent 15-min infusion of 15 μg/min of somatostatin suppressed the fasting motilin level by 50%. The disappearance half-time was 4.56 min. It is concluded that both synthetic and endogenous motilin are eliminated by first order kinetics with very similar half-times. The data also suggest that the previously reported motilin infusions at these dose levels gave plasma concentrations within the physiological range and that the effects noted may thus have reflected the physiological actions of motilin.

2985 ANTIBODY-DEPENDENT CELL-MEDIATED CYTOTOXICITY. COMPARATIVE ABILITY OF MURINE PEYER'S PATCH AND SPLEEN CELLS TO LYSE LIPOPOLYSACCHARIDE-COATED AND UNCOATED ERYTHROCYTES. (Eng.) Kagnoff, M. F.; Campbell, S. (Dept. Medicine, Univ. California, San Diego, La Jolla, CA 92037). *Gastroenterology* 70(3):341-346; 1976.

The ability of Peyer's patch cells and of spleen cells to kill target cells by antibody-dependent cell-mediated cytotoxicity (ADCC) was assessed. Chicken RBC were coated with bacterial lipopolysaccharides (LPS) and labeled with ^{51}Cr. Anti-serum was produced against these cells, as well as against uncoated, labeled cells. Normal spleen cells from unimmunized mice specifically lysed both type of cells when the appropriate anti-serum was present. However, Peyer's patch cells did not kill either target cell in the presence of their anti-sera. Peyer's patches in mice appear to be deficient in the effector cell type(s) required to kill antibody-coated RBC target cells by an ADCC mechanism, as well as the macrophage-like accessory adherent cell type(s) required for the induction of humoral antibody synthesis and cell-mediated cytotoxic allograft reactions *in vitro*. The authors suggest that models of ADCC may be useful when determining mechanisms of immune tissue injury in certain intestinal diseases.

2986 FASTING AND REFEEDING: CELL KINETIC RESPONSE OF JEJUNUM, ILEUM AND COLON. (Eng.) Hagemann, R. F.; Stragand, J. J. (Allegheny General Hosp., 320 East North Ave., Pittsburgh, PA 15212). *Cell Tissue Kinet.* 10(1):3-14; 1977.

Adult female Ha/ICR mice were fasted and then fed their normal diet of lab chow or a low residue diet. At various intervals during fasting and refeeding, mice were sacrificed 30 min after injecting 50 μCi of tritiated thymidine. Colonic, ileal, and jejunal tissue samples were checked for cell proliferation by counting the disintegrations/min/mg of wet tissue, the number of labeled nuclei per single isolated crypt, and the number of mitotic figures per crypt. During the fasting time, the ileal and jejunal crypt proliferative compartments and the total crypt cellularity decreased significantly, while the G_1 and S phases of the cell cycle were lengthened. After refeeding, the proliferation levels gradually returned to normal values, with a slight overshoot in S-phase cellularity. Fasting had no effect on the colonic proliferative compartment or the cellularity, but the G_1 phase doubled. Refeeding caused a prompt increase in proliferative indices, with peak S cellularity levels exceeding the fasting levels four times and twice the control values. These changes in cellularity caused by dietary manipulation may provide a useful tool for further investigations of colonic carcinogenesis.

2987 THE IMPORTANCE OF Clostridia IN EXPERIMENTAL INTESTINAL STRANGULATION.

(Eng.) Yale, C. E.; Balish, E. (Univ. Wisconsin Medical Sch., Madison, WI). *Gastroenterology* 71(5):793-796; 1976.

Hemorrhagic and ischemic strangulation of closed intestinal segments was studied in germ-free rats individually monocontaminated with one of eight separate species of *Clostridia*. The *Clostridia*, ranked in the order of decreasing lethality were: *Clostridium perfringens* type A, *C. septicum, C. histolyticum, C. haemolyticum, C. bifermentans, C. sporogenes, C. tertium, and C. novyi* type A. *C. histolyticum* and *C. septicum* killed all animals within 26-70 hr after operation, whereas *C. bifermentans, C. novyi, C. perfringens,* and *C. sporogenes* were relatively nonlethal. The individual species of *Clostridium* produced the same pattern of survival, regardless of whether the test segment was hemorrhagically or ischemically strangulated. In the presence of dead tissue, *C. perfringens* was the most potent of the *Clostridia*, killing all animals within 7-11 hr after operation, whereas *C. novyi* continued to be inocuous. All species were readily established in the gastrointestinal tracts of the nonoperated germ-free rat. The *Clostridia* appear to be one of the most potentially lethal groups of organisms commonly found in the intestinal tract of humans and animals.

2988 SUPPRESSION OF GIARDIASIS DURING THE INTESTINAL PHASE OF TRICHINOSIS IN THE MOUSE.

(Eng.) Roberts-Thomson, I. C.; Grove, D. I.; Stevens, D. P.; Warren, K. S. (Univ. Hosp., Cleveland, OH 44106). *Gut* 17(12):953-958; 1976.

The interaction of the intestinal phases of *Giardia muris* and *Trichinella spiralis* was investigated in Swiss albino mice in an effort to clarify nonimmunological host defense mechanisms. Intraesophageal inoculation of *G. muris* cysts 7 days before, or 7 days after, similar inoculation of *T. spiralis* larvae resulted in significant reduction in the numbers of *Giardia* trophozoites in the small bowel and *Giardia* cysts in stools. This effect was not observed when *G. muris* cysts were administered after resolution of the intestinal phase of trichinosis. Giardiasis had no effect on trichinosis, as assessed by numbers of adult worms in the small bowel and larvae in skeletal muscles. The intestinal phase of trichinosis was associated with increased numbers of inflammatory cells in the lamina propria of the small bowel, a significant increase in Paneth cells in crypts, and a marked reduction in the villus to crypt ratio of jejunum. These observations suggest that the intestinal phase of trichinosis induced environmental changes in the small bowel, perhaps related to inflammation, which resulted in suppression of proliferation of *Giardia* trophozoites.

2989 EXPERIMENTAL PROTEIN-LOSING GASTROENTEROPATHY: ROLE OF TISSUE PLASMINOGEN ACTIVATOR.

(Eng.) Kondo, M.; Nakanishi, K.; Bamba, T.; Hosokawa, K.; Masuda, M. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Gastroenterology* 71(4):631-634; 1976.

To add further support to the previous clinical observation that tissue fibrinolytic activity in the digestive mucosa of patients with protein-losin gastroenteropathy is increased, fibrinolytic activit was studied in male Wistar rats with different type of experimental protein-losing gastroenteropathies. This condition was produced by x-irradiation, 5-fluorouracil treatment (25 mg/kg, i.p.), or ligatio of the thoracic duct. The first two models showed an increase of fibrinolytic activity and of ^{131}I-polyvinylpyrrolidone (^{131}I-PVP) excretion. Irradiated rats excreted 8.9% of the administered dose of ^{131}I-PVP in 5 days, but excreted only 4.3% of the dose when treated with *trans*-4-aminomethyl cyclohexane carboxylic acid (*trans*-AMCHA); this indicates that antiplasmin was effective in preventing enteric protein loss after irradiation. Nonirradiated rats receiving saline or *trans*-AMCHA excreted 3.9% and 3.7%, resp., of the injected ^{131}I-PVP. The mean 5-day ^{131}I-PVP excretion of 5-fluorouracil-treated rats was 13.9%, whereas that of controls was 4.2%; *trans*-AMCHA treatment reduced this excretion to 6.9%. Normal fibrinolysi was seen in the thoracic duct-ligated animals, and the administration of *trans*-AMCHA did not prevent ^{131}I-PVP fecal excretion. The results support the hypothesis that tissue fibrinolysis in the digesti mucosa plays an important role in the pathogenesis of protein-losing gastroenteropathy associated wit diseases of the mucosa.

2990 EVOLUTION OF LESIONS IN INTESTINAL ISCHE

(Eng.) Ming, S. C.; Bonakdarpour, A. (Temple Univ. Health Sciences Center, 3400 N. Broa St., Philadelphia, PA 19140). *Arch. Pathol. Lab. Med.* 101(1):40-43; 1977.

Small intestinal ischemia was produced in dogs by ligation and division of a branch of the superior mesenteric artery, and the development of lesions was studied. The bowel was examined on or before the 60th day after the induction of ischemia. The bowel lesions included patchy mucosal necrosis, ul ceration, and stenosis. Mucosal congestion was present in all seven dogs killed up to 22 days aft operation. Ulceration was accompanied by severe submucosal inflammation in a uniform pattern. Mu-

osal regeneration occurred from either the remnants
f glands in the ulcer base or the mucosa at the
lcer margin. The regenerated mucosa was lined
ith irregular glands without villous formation.
arly villous formation was seen 22 days after oper-
tion. With healing, inflammation slowly regressed,
nd the granulation tissue became evident. By about
ay 30 after operation, well developed villi that
ere shorter and more blunt than normal were seen
n regenerated mucosa. The underlying submucosa was
ibrosed; the fibrous tissue was vascular in some
reas and collagenous in others. Focal disruption
f the muscularis mucosa and loss of ganglion cells
ere common, although the muscularis propria remained
argely intact. The malabsorption and slow return
f bowel function in patients with intestinal is-
hemia is explained by the incomplete development of
he villi in the regenerated mucosa.

991 EFFECT OF PENTAGASTRIN ON BLOOD FLOW DISTRIBUTION IN THE STOMACH OF CATS WITH GAS- RIC ULCER.

(Eng.) Skarstein, A.; Svanes, K.;
reide, O.; Varhaug, J. E. (Dept. General Surgery,
niv. Bergen, Haukeland Hosp., Bergen, Norway).
cand. J. Gastroenterol. 12(1):71-76; 1977.

esthetized cats with week-old-induced gastric
lcers and normal controls were given pentagastrin
.15 or 0.3 µg/kg/min, i.v.) for 20 min, and labeled
icrospheres were used to measure the blood flow in
astric tissues. The blood flow in the muscularis
as not influenced by pentagastrin in any of the
nimals. Normal cats showed an increase in mucosal
lood flow to all parts of the stomach, except the an-
rum, after pentagastrin administration, while cats
ith ulcers had no significant change in the mucosal
lood flow. These findings indicate that pentagastrin
ay act through local release of histamine. Cats with
lcers may not respond to gastrin because of vasal
onstriction caused by H^+ backflow in the injured
ucosa. The release of prostaglandin E_1 in the in-
lamed area may also counteract the effect of penta-
astrin.

92 SUDDEN POTENTIAL DROP IN BULLFROG GASTRIC MUCOSA.

(Eng.) Kidder, G. W. III; Mont-
omery, C. W. (Univ. Maryland Sch. Dentistry, Balti-
ore, MD 21201). *Am. J. Physiol.* 230(1):61-66; 1976.

e relationship between voltage and transepithelial
ssue resistance was used to measure conditions
ecessary for the sudden potential drop (SPD) occur-
ing under anoxia in 10% CO_2 in bullfrog (*Rana cates-*
iana) gastric mucosa. An equivalent circuit model
at helps to explain many of the properties of SPD
presented. The SPD and corresponding drop in re-
istance occurred regularly at 10% CO_2 per 25 mM HCO_3
H 7.1), but never at 5% CO_2 per 25 mM HCO_3 (pH 7.4);
seemed to control this effect. The resistance drop
crossing the critical clamp voltage was 171 ± 21
ms/cm^2; Rm dropped to 85% of its "high voltage" at
is time ($p<0.01$). Increasing the clamp voltage
ck to 120 mV resulted in a rise of 490 ± 74 ohms/cm^2.
resistant drop could not be produced by voltage
lamping under aerobic conditions. SPD did not occur
when Cl^- was removed from the solution. Cl^- was apparently necessary for the SPD response, even when the voltages were maintained at normal values by clamping. While the pH dependence of the SPD could not consistently be demonstrated in phosphate-buffered solutions, the trend favored lower pH values. Since neither Na^+ or K^+ gave a significant voltage change during post-SPD anoxia, the postulated shunt pathway does not seem to involve selective permeability for either ion. The proposed model does not predict the observed rise in potential difference (PD), which normally accompanies the first few minutes of anoxia, nor does it predict the PD reversal, which occurs with this response.

2993 AMYLASE CLEARANCE IN ACUTE PANCREATITIS: EXPERIMENTAL STUDY IN THE GUINEA PIG.

(Eng.) Orda, R.; Orda, S.; Wiznitzer, T.; Bawnik, J. B. (2 Ashbourne Mansions, Ashbourne Ave., London N.W.11., England). *J. Surg. Res.* 21(6):457-461; 1976.

Amylase clearance was studied in guinea pigs with experimental acute pancreatitis, duodenal perforation, or intestinal infarction. Pancreatitis was induced by the interstitial injection into the pancreatic parenchyma of sodium taurocholate (1 ml). The mean serum amylase levels were 1,044.0 ± 289.6, 1.553.1 ± 671.9, 1,472.0 ± 283.0, and 1,335.1 ± 287.1 Somogyi U in normal controls, pancreatitis, duodenal perforation, and intestinal infarction, resp. These values were not significantly different. The amylase-creatinine clearance ratio was significantly increased ($p<0.001$) in the animals with acute pancreatitis in comparison with the other groups; the mean values were 1.8 ± 0.7%, 4.5 ± 1.6%, 2.0 ± 0.7%, and 1.8 ± 0.7% for the normal controls, acute pancreatitis, duodenal perforation, and intestinal infarction groups, resp. The results illustrate the value of the amylase-creatinine clearance determination in the differential diagnosis of acute pancreatitis.

2994 THE GASTROINTESTINAL CIRCULATION.

(Eng.) Lanciault, G.; Jacobson, E. D. (Univ. Texas Medical Sch. at Houston, Houston, TX 77025). *Gastroenterology* 71(5):851-873; 1976.

2995 SOMATOSTATIN AND HAEMOSTASIS IN EXPERIMENTAL CONDITIONS IN DOGS [Abstract].

(Eng.) Gabryelewicz, A.; Prokopowicz, J.; Wolosowicz, N.; Szalaj, W.; Hnidec, O. (Medical Sch., Bialystock, Poland). *Scand. J. Gastroenterol.* 11(41):50; 1976.

2996 NONSPECIFIC INHIBITORY ACTION OF CHINOFORM ON GASTROINTESTINE.

(Eng.) Takayanagi, I.; Hayakawa, K.; Terawaki, Y.; Tamura, Z.; Takagi, K. (Dept. Chemical Pharmacology, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *Jpn J. Pharmacol.* 26(4):515-518; 1976.

2997 PERFLUOROCTYLBROMIDE AS A DIAGNOSTIC CONTRAST MEDIUM IN GASTROENTEROGRAPHY.

(Eng.) Liu, M. S.; Long, D. M. (Hektoen Inst.

Medical Res., 627-637 South Wood St., Chicago, IL 60612). *Radiology* 122(1):71-76; 1977.

2998 TRANSFER OF COMPUTER-AIDED DIAGNOSIS OF DYSPEPSIA FROM ONE GEOGRAPHICAL AREA TO ANOTHER. (Eng.) Horrocks, J. C.; Lambert, D. E.; McAdam, W. A. F.; Morgan, A. G.; Pacsoo, C.; Darnborough, A.; De Dombal, F. T. (Airedale General Hosp., Steeton, Keighley BD20 6TD, Yorkshire, England). *Gut* 17(8):640-644; 1976.

2999 Ca^{2+} MOVEMENTS AND "PHOSPHATIDYLINOSITOL TURNOVER" IN RAT PAROTID GLANDS STIMULATED BY MUSCARINIC AGONISTS [Abstract]. (Eng.) Keryer, G.; Chambaut-Guerin, A. M.; Rossignol, B. (Inst. Biochimie, Universite de Paris-Sud, 91405, Orsay, France). *Scand. J. Gastroenterol.* 11(41):84; 1976.

3000 INFLAMMATORY CELLS IN DUCT-LIGATED SALIVARY GLANDS OF THE CAT: A HISTOCHEMICAL STUDY. (Eng.) Harrison, J. D.; Garrett, J. R. (King's Coll. Hosp. Dental Sch., London SE5 8RX, England). *J. Pathol.* 120(2):115-119; 1976.

3001 INTERFERENCE WITH THE SERUM GASTRIN RESPONSE TO FEEDING AFTER SURGICAL INTERVENTION WITH THE RAT THYROPARATHYROID COMPLEX. (Eng.) Cooper, C. W.; Doppelt, S. H.; Talmage, R. V. (Sch. Medicine, Univ. North Carolina, Chapel Hill, NC 27514). *Proc. Soc. Exp. Biol. Med.* 153(1):16-21; 1976.

3002 MORPHOLOGICAL AND FUNCTIONAL DEVELOPMENT OF THE STOMACH IN CHILDREN. (Cze.) Sedlackova, M. (121 09 Praha 2, Ke Karlovu 2, Czechoslovakia). *Cas. Lek. Cesk.* 115(38):1161-1167; 1976.

3003 FOCAL GASTRIC MUCOSAL BLOOD FLOW MEASUREMENTS BY PHOTOELECTRIC PLETHYSMOGRAPHY-TECHNIQUE AND DESIGN [Abstract]. (Eng.) Steuer, R. R.; Moody, F. G.; McGreevy, J. M. (Univ. Utah, Surgery Dept., Salt Lake City, UT 84132). *Fed. Proc.* 36(3):594; 1977.

3004 INDEPENDENCE OF CANINE GASTRIC AND DUODENAL PACESETTER POTENTIALS SHOWN BY ELECTRIC PACING. (Eng.) Gladen, H. E.; Kelly, K. A. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 52(1):51-53; 1977.

3005 SINGLE-DOSE-RESPONSE CURVES OF MURINE GASTROINTESTINAL CRYPT STEM CELLS. (Eng.) Masuda, K.; Withers, H. R.; Mason, K. A.; Chen, K. Y. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Radiat. Res.* 69(1):65-75; 1977.

3006 EFFECT OF TOURNIQUET ISCHEMIA ON INTRACELLULAR PO_2 AND PD IN THE CANINE GASTRIC MUCOSA [Abstract]. (Eng.) Bowen, J. C.; Garg, D. K. (Alton Ochsner Medical Center, New Orleans, LA). *Clin. Res.* 25(1):16A; 1977.

3007 CONSTITUENTS FROM SEEDS OF *Alpinia galanga* WILD, AND THEIR ANTI-ULCER ACTIVITIES. (Eng.) Mitsui, S.; Kobayashi, S.; Nagahori, H.; Ogiso, A. (Central Res. Lab., Sankyo Co., Ltd., 1-2-58, Hiromachi, Shinagawa-ku, Tokyo, 140, Japan). *Chem. Pharm. Bull.* 24(10):2377-2382; 1976.

3008 EFFECT OF BILATERAL ADRENALECTOMY AND PARENTERAL BETAMETHASONE ON GASTRIC MUCOSAL MAST CELL POPULATION IN ALBINO RATS. (Eng.) Sathiamoorthy, S. S.; Ganguly, A. K.; Bhatnagar, O. P. (Jawaharlal Inst. Post-graduate Medical Education and Res., Pondicherry 605006, India). *Experientia* 32(10):1300-1301; 1976.

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3010 COMPARISON OF DIFFERENT MORPHOMETRIC METHODS TO ESTIMATE THE SURFACE OF THE RAT INTESTINAL MUCOSA. THEIR RELATIONSHIP TO INTESTINAL FUNCTION. (Ger.) Lorenz-Meyer, H.; Kohn, R.; Riecken, E. O. (Medizinische Universitatsklinik, D-3550 Marburg/Lahn, W. Germany). *Histochemistry* 49(2):123-129; 1976.

3011 MOTILITY- AND BLOOD FLOW-DEPENDENT ABSORPTION OF AMINO ACIDS IN CANINE SMALL INTESTINE [Abstract]. (Eng.) Pytkowski, B.; Michalowski J. (Medical Center of Postgraduate Education, Warsaw Poland). *Eur. J. Clin. Invest.* 6(4):318; 1976.

3012 REGULATION OF MUCOSAL GROWTH BY SINGLE AMINO ACIDS [Abstract]. (Eng.) Spector, M. H.; Traylor, J. B.; Young, E. A.; Weser, E. (Univ. Texas Health Science Center, San Antonio, TX) *Clin. Res.* 25(3):319A; 1977.

3013 DECONJUGATION OF BILE ACIDS BY INTESTINAL LACTOBACILLI. (Eng.) Gilliland, S. E.; Speck, M. L. (Dept. Animal Science and Industry, Oklahoma State Univ., Stillwater OK 74074). *Appl. Environ. Microbiol.* 33(1):15-18; 1977.

3014 PURIFICATION OF RAT INTESTINAL RECEPTOR FOR INTRINSIC FACTOR VITAMIN B-12 COMPLEX BY AFFINITY CHROMATOGRAPHY. (Eng.) Yamada, S.; Itaya, H.; Nakazawa, O.; Fukuda, M. (Hokkaido Univ. Education, Sapporo, Japan). *Biochim. Biophys. Acta* 496(2):571-575; 1977.

3015 FUNCTIONAL CHARACTERISTICS OF INTESTINAL PEYER'S PATCH LYMPHOID CELLS. (Eng.) Kagnoff, M. F. (Dept. Medicine, Univ. California, San Diego, La Jolla, CA 92093). *Ann. N.Y. Acad. Sci.* 278:539-545; 1976.

3016 THE ACTIVATED STATE OF HUMAN INTESTINAL MUCOSAL LYMPHOID CELLS [Abstract]. (Eng.) Bull, D. M.; Bookman, M. A. (Beth Israel Hosp., Boston, MA). *Clin. Res.* 25(3):467A; 1977.

3017 PROTEIN OF INTESTINAL LYMPH DURING DIGESTION AND ABSORPTION OF FAT [Abstract]. (Eng.) Barrowman, J. A.; Turner, S. G. (Memorial Univ., St. John's, Newfoundland, Canada). *Clin. Res.* 24(5):664A; 1976.

3018 AVASCULAR TRANSPLANTATION OF SMALL BOWEL IN NEWBORN PIGLETS. (Eng.) Klos, I. (Kinderchirurgische Klinik, Karl-Wilhelmstrasse 1, D-7500 Karlsruhe, W. Germany). *J. Pediatr. Surg.* 12(1):43-48; 1977.

3019 HYPERPRODUCTION OF THE EPITHELIUM AND ITS VITAL REJECTION INTO THE SMALL INTESTINAL LUMEN OUTSIDE THE "EXPULSION ZONE." (Rus.) Rudenskaya, M. V. (N.V. Sklifosovsky Res. Inst. First Aid, Moscow, USSR). *Biull. Eksp. Biol. Med.* 82(9):1133-1135; 1976.

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3021 EXPERIMENTAL COLITIS. (Eng.) MacPherson, B.; Pfeiffer, C. J. (Faculty Medicine, Memorial Univ. Newfoundland, St. John's A1C 5S7, Canada). *Digestion* 14(5/6):424-452; 1976.

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3023 EXPERIMENTAL MODELS OF HIRSCHSPRUNG'S DISEASE. (Spa.) Martinez-Almoyna, C. M.; Monereo, J. (Clinica Infantil "La Paz," Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(5):543-556; 1976.

3024 CECAL RESPONSE TO DIFFERENT MOLECULAR WEIGHTS AND TYPES OF CARRAGEENAN IN THE GUINEA PIG. (Eng.) Engster, M.; Abraham, R. (Albany Medical Coll., Albany, NY 12208). *Toxicol. Appl. Pharmacol.* 38(2):265-282; 1976.

3025 SUPPRESSION OF DELAYED-TYPE HYPERSENSITIVITY BY ORAL ANTIGEN ADMINISTRATION [Abstract]. (Eng.) Kagnoff, M. F. (Univ. California, San Diego, La Jolla, CA). *Clin. Res.* 25(3):313A; 1977.

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3028 NEW HEPATO-PROTECTIVE AGENTS. II. MALEOPIMARIDYL MORPHOLIDES. (Eng.) Danswan, G. W.; Matharu, S.; Ramm, P. J.; Taylor, J. B. (Roussel Lab. Ltd., Kingfisher Drive, Covingham, Swindon, Wiltshire, England). *Arzneim. Forsch.* 26(12):2190-2192; 1976.

3029 THE PROTECTIVE EFFECT OF A NOVEL COMPOUND RU 18492, ON GALACTOSAMINE-INDUCED HEPATOTOXICITY IN THE RAT. (Eng.) James, G. W. L.; Pickering, R. W. (Roussel Lab. Ltd., Kingfisher Drive, Covingham, Swindon, Wiltshire, England). *Arzneim. Forsch.* 26(12):2197-2199; 1976.

3030 SERUM ALPHA-FETOPROTEIN: A PROGNOSTIC INDICATOR OF LIVER-CELL NECROSIS AND REGENERATION FOLLOWING EXPERIMENTAL INJURY BY GALACTOSAMINE IN RATS. (Eng.) Sell, S.; Stillman, D.; Gochman, N. (Univ. California at San Diego, Medical Sch., La Jolla, CA 92093). *Am. J. Clin. Pathol.* 66(5):847-853; 1976.

3031 PROPERTIES OF HEPATIC TISSUE EXTRACTS: 2. AN APPROACH TO THE ARTIFICIAL LIVER. (Eng.) Mizuno, K.; Goya, T.; Kimura, H.; Inou, T. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Minato-ku, Tokyo 108, Japan). *Jpn. J. Exp. Med.* 46(5):273-276; 1976.

3032 EFFECT OF HEPATIC VENOUS OUTFLOW OBSTRUCTION ON PORES AND FENESTRATIONS IN SINUSOIDAL ENDOTHELIUM. (Eng.) Nopanitaya, W.; Lamb, J. C.; Grisham, J. W.; Carson, J. L. (Sch. Medicine, Univ. North Carolina at Chapel Hill, Chapel Hill, NC 27514). *Br. J. Exp. Pathol.* 57(5):604-609; 1976.

3033 TYPHLOHEPATITIS IN HAMSTERS INFECTED PERORALLY WITH THE TYZZER'S ORGANISM.

(Eng.) Nakayama, M.; Machii, K.; Goto, Y.; Fujiwara, K. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Minato-ku, Tokyo 108, Japan). *Jpn. J. Exp. Med.* 46(5):309-324; 1976.

3034 HEPATIC FUNCTION AFTER ACUTE OR SUBCHRONIC NICOTINE ADMINISTRATION IN UNTREATED MICE AND MICE TREATED WITH HEPATOTOXIC CHEMICALS. (Eng.) Priestly, B. G.; Plaa, G. L. (Dept. Human Physiology and Pharmacology, Univ. Adelaide, Adelaide, South Australia). *Arch. Int. Pharmacodyn. Ther.* 223(1): 132-141; 1976.

3035 ACTIVE ENHANCEMENT OF CANINE LIVER ALLOGRAFTS--EFFECT OF PRETREATMENT WITH PREDNISOLONE AND DONOR-SPECIFIC ANTIGEN. (Eng.) Lie, T. S.; Nakano, H.; Bumanowski, W.; Rommelsheim, K. (Chirurgische Universitats Klinik, 53 Bonn, Bonn, W. Germany). *Surgery* 80(5):565-568; 1976.

3036 THE EFFECT OF HEPATECTOMY ON THE ENERGY STATE AND ON ACID-BASE VARIABLES OF THE RAT BRAIN. (Eng.) Holmin, T. (Univ. Hosp., S-221 85 Lund, Sweden). *Scand. J. Clin. Lab. Invest.* 36(5):423-429; 1976.

3037 THE ACTION OF PANCREATIC CARCINOGENS ON THE HYPERTROPHIED PANCREAS OF THE RAT [Abstract]. (Eng.) Morgan, R. G. H.; Hopwood, D.; Iwatsuki, N.; Levison, D.; Petersen, O. H.; Ueda, N.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Scand. J. Gastroenterol.* 11(41):67; 1976.

3038 SOMATOSTATIN INHIBITS THE INCREASE OF SERUM TRIGLYCERIDE CONCENTRATION FOLLOWING A TEST MEAL [Abstract]. (Eng.) Pointner, H.; Hengl, G.; Bayer, P. M.; Flegel, U. (Dept. Medicine, Univ. Vienna, Vienna, Austria). *Scand. J. Gastroenterol.* 11(41):51; 1976.

See also, 2677, 2718, 2788, 2822, 2839, 2966, 3252, 3318.

DIAGNOSTIC PROCEDURES

3039 ROENTGENOLOGIC FEATURES OF CAUSTIC CHANGES IN THE UPPER INTESTINAL TRACT. (Ger.) Frommhold, H.; Rohner, H. G.; Koischwitz, D.; Kuhr, J. (Radiologische Universitatsklinik, 5300 Bonn-Venusberg, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6):514-520; 1976.

Functions of radiology and endoscopy in determining the form and extent of caustic damage in early and late stages of upper gastrointestinal tract disease in humans are compared. The importance of radiology in demonstrating perforations, controlling drug and dilatation therapy, and showing the presurgical condition is outlined. Endoscopy, on the other hand, should be utilized in the differentiation of early caustic damage when the x-ray is negative, in the control of the disease course during therapy, and in the clarification of atypical late changes to exclude malignant degeneration.

3040 DIAGNOSTIC VALUE OF BIOPSY, GUIDED LAVAGE, AND BRUSH CYTOLOGY IN ESOPHAGOGASTROSCOPY. (Eng.) Halter, F.; Witzel, L.; Gretillat, P. A.; Scheurer, U.; Keller, M. (Inselspital, 3010 Berne, Switzerland). *Am. J. Dig. Dis.* 22(2):129-131; 1977.

In a prospective study, 96 patients with esophageal and gastric lesions were investigated by multiple endoscopic biopsy, brush cytology, and guided lavage cytology, to evaluate the diagnostic accuracy of each of these methods. Fifty malignant and 46 benign lesions were found. The final diagnosis was proven by operation or autopsy in 53 patients, by multiple endoscopic follow-up in 31, and by clinical control in 8. No follow-up was possible in four patients. The malignant lesions were diagnosed by multiple biopsy in 86.0%, by brush cytology in 84.0%, and by lavage cytology in 50.0%. The diagnostic yield of lavage cytology was significantly lower ($p<0.01$) than the other methods. A combination of multiple biopsy and brush cytology is the most valuable aid in endoscopic diagnosis of esophageal and gastric malignancy, with a diagnostic accuracy of 96%.

3041 DIAGNOSTIC METHODS IN THE BULBUS DUODENI. AGREEMENT AND DISAGREEMENT BETWEEN ENDOSCOPIC, ROENTGENOLOGICAL AND HISTOLOGICAL EXAMINATIONS. (Ger.) Dette, G. A.; Fruhmorgen, P.; Classen, M.; Bauerle, H.; Kissling, U.; Demling, L. (Institut fur Physiologische Chemie II der Universitat Marburg, Deutschhausstr. 1-2, D-3550 Marburg, W. Germany). *Munch. Med. Wochenschr.* 119(5):139-142; 1977.

Of 1,012 patients examined by endoscopy with biopsy and upper gastrointestinal series, pathological findings were detected in 346 patients (268 men, 78 women). Nonspecific upper gastric and ulcer symptoms and hematemesis and bloody stool were the most frequently encountered complaints. Endoscopic and roentgenological findings totally agreed in 210 cases (64.6%), but they showed disagreement in 115 patients (35.4%). The most controversial findings were in cases of cicatricial ulcer/duodenal ulcer or *vice versa*. False-negative ulcer findings were noted in 20.8%, and false-positives in 28%. The findings were questionable in 26%. Bulbus symptoms occurred about 10 yr later in women than in men. A carcinoma was diagnosed falsely by roentgenologic findings, but none of five endoscopically and histologically confirmed cases of malignancies were overlooked.

3042 PROCTOSIGMOIDOSCOPY AND RECTAL BIOPSY IN INFANTS AND CHILDREN. (Eng.) Vanderhoof, J. A.; Ament, M. E. (Univ. California Los Angeles Sch. Medicine, Los Angeles, CA 90024). *J. Pediatr.* 89(6):911-915; 1976.

The records of patients aged 2 days to 20 yr (median age, 2 yr) who underwent proctosigmoidoscopy and/or rectal biopsy over a 27-month period were reviewed to determine the efficacy and safety of these procedures in pediatric patients. One hundred twenty-one patients underwent proctosigmoidoscopy; 91 of these also had rectal biopsies. Thirty-four patients had rectal biopsy alone. The depth of examination was 10-15 cm in most patients older than 10 yr, and this was also true in many small infants. The four most common indications for proctosigmoidoscopy included chronic diarrhea (42), rectal bleeding (23), bloody diarrhea (20), and abdominal pain (12). Proctosigmoidoscopy showed normal results in 10 of the 12 patients with abdominal pain. The findings were abnormal in 17, 17, and 19 of the patients with chronic diarrhea, rectal bleeding, and bloody diarrhea, resp. Ulcerative colitis was the most common diagnosis (24 patients) in patients with rectal bleeding, with or without diarrhea. Induced friability was the most frequently described mucosal abnormality (58 patients) and occurred in the absence of spontaneous friability in 18 patients, indicating that multiple mucosal wipe tests are necessary to exclude colitis by proctosigmoidoscopy. Anal fissures were found in only 4 of 23 patients with rectal bleeding. Morbidity was 0% with proctosigmoidoscopy and 0.34% with rectal suction biopsy. These studies demonstrate the safety of performing both proctosigmoidoscopy and rectal biopsy, even in very small infants.

3043 VISUALIZATION OF THE LATERAL EDGE OF THE LIVER IN ASCITES. (Eng.) Love, L.; Demos, T. C.; Reynes, C. I.; Williams, V.; Shkolnik, A.; Gandhi, V.; Zerofos, N. (Loyola Univ. Medical Center, 2160 S. First Ave., Maywood, IL 60153). *Radiology* 122(3):619-622; 1977.

Thirty-five cases of ascites were studied to determine whether medial displacement of the lateral edge of the liver is pathognomonic of ascites. Techniques included plain radiographs, total-body opacification, tomography, radio-nuclide imaging, peritoneography, and/or ultrasonography. The lateral margin of the liver was demonstrated on the preliminary radiograph unequivocally in 16 cases and questionably in 3. In the remaining 16 cases, medial displacement was visualized by total-body opacification, peritoneography, radionuclide imaging, or ultrasonography. Separation of the liver and kidney was seen on ultrasonograms in every case; visualization was increased by the addition of increments of fluid in patients undergoing peritoneal dialysis. Since the liver is surrounded by fluid, an interface between it and the extraperitoneal fat cannot account for the displacement seen on plain radiographs; rather, this is the result of a difference in density between liver and fluid.

3044 HEPATIC DUCT DIVERTICULUM SIMULATING A CHOLEDOCHAL CYST.

(Eng.) Schey, W. L.; Pinsky, S. M.; Lipschutz, H. S.; Dragomer, A. S. (Michael Reese Medical Center, 29th St. and Ellis Ave., Chicago, Il 60616). *Am. J. Roentgenol.* 128(2): 318-320; 1977.

The case of a 12-yr-old boy with a hepatic duct diverticulum simulating a choledochal cyst is presented. The patient presented with a right upper quadrant mass, hepatosplenomegaly, fatigue, and abdominal pain. No jaundice was present. Radiographically, the findings of a displaced gallbladder and duodenum were consistent with a choledochal cyst. In addition, the alkaline phosphatase level was high (123 Bodansky U). The presence of esophageal varices, the absence of jaundice, and the absence of infection made the diagnosis of choledochal cyst less likely. Hepatic scanning with ^{67}Ga citrate yielded findings similar to those of a ^{99m}Tc sulphur colloid study; a noninflammatory, nonneoplastic, "cystic" impression or intrahepatic cystic mass was suggested by both examinations. The correct diagnosis was suggested preoperatively, primarily because of the location of the "mass," the high alkaline phosphatase value, and the absence of jaundice.

3045 GRAY SCALE ULTRASOUND AND ISOTOPE SCANNING: COMPLEMENTARY TECHNIQUES FOR IMAGING THE LIVER.

(Eng.) Taylor, K. J. W.; Sullivan, D.; Rosenfield, A. T.; Gottschalk, A. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Roentgenol.* 128(2):277-281; 1977.

Five cases are presented in which liver examination by gray scale ultrasound allowed a definitive diagnosis of an abnormality observed on the isotope scan or resolved the cause of an equivocal isotope scan into a definite abnormality or an anatomic variation. In the first patient, a 52-yr-old woman who had undergone a left mastectomy for carcinoma, a ^{99m}Tc sulfur colloid scan suggested metastatic disease in the right liver lobe. Gray scale ultrasound examination demonstrated a cystic lesion with a regular, well defined, margin and no evidence of internal echoes, and a repeat echo examination 6 months later showed no change in size or shape of the cyst. In a second patient with a positive ^{99m}Tc scan, ultrasound revealed a large abnormality consisting of a thick rim of high-level echoes with low central ones, suggesting an abscess, which was confirmed surgically. The liver scan in the third patient, a 65-yr-old woman in whom a cystadenocarcinoma of the ovary had been removed, demonstrated a questionable defect at the porta hepatis, interpreted as an anatomic variant. Ultrasound showed an irregular mass, returning low-level echoes, invadin the liver, and the patient subsequently succumbed with liver metastasis. In the fourth patient, the isotope liver scan suggested an enlarged renal impression or a intrahepatic lesion; ultrasound showed an irregular mass situated above the right kidney and extending deeply into the right liver lobe, a characteristic of metastatic liver involvement (in this case from a breast malignancy). The liver scan in a 29-yr-old man treated for testicular teratoma suggested a normal gallbladder fossa; ultrasound examination showed three 2-cm tumors, partially necrotic. The findings were confimred at autopsy. Ultrasound is now an important complementary technique to radioisotope scanning.

3046 ULTRASONIC AND RADIOGRAPHIC CHOLECYSTOGRAPHY.

(Eng.) Bartrum, R. J., Jr.; Crow, H. C.; Foote, S. R. (Dartmouth Medical Sch., Hanover, NH 03755). *N. Engl. J. Med.* 296(10):538-541; 1977.

To define the relative merits of radiographic and ultrasonic cholecystography, 208 patients with possible cholelithiasis were studied. The patients underwent both procedures, and the results were interpreted in blind fashion. Two hundred patients had satisfactory confirmation of their diagnosis, by either a well visualized radiographic cholecystogram or operation or both. The overall accuracy of the ultrasonic examination was 93%, with a false-negative rate of 11% and an indeterminate rate of 4%. The indeterminate rate was 24% for the single-dose p.o. cholecystogram and 8% for the double-dose cholecystogram. Both ultrasonic cholecystography and radiographic cholecystography are useful in the detection of gallstones. The findings support the use of single-dose p.o. cholecystography as the routine first examination. If the gallbladder is not satisfactorily visualized, ultrasonic cholecystography can be performed immediately. In an emergency or for patients with a suspected pregnancy, ultrasonic cholecystography is available as the initial examination.

3047 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH SELECTIVE CATHETERIZATION OF THE COMMON BILE DUCT.

(Eng.) Burcharth, F.; Nielbo, N. (Gentofte Hosp., Univ. Copenhagen, DK-2900 Hellerup, Copenhagen, Denmark). *Am. J. Roentgenol.* 127(3):409-412; 1976.

Percutaneous transhepatic cholangiography with selective catheterization of the common bile duct was carried out in 86 patients with jaundice in whom the diagnosis could not be established by conventional means. The catheter was introduced through the mid-axillary line at the level of the 12th thoracic vertebra. Where possible, the bile duct was entered o the right side of the hilus, allowing the catheter to be conducted by the guidewire technique to the common duct or close to an obstruction. If successful puncture of a bile duct did not occur at the first attempt, the direction of the cannula was altered without completely retracting it from the liver. In cases of biliary obstruction, the catheter was left in place for external bile drainage. The biliary tree was visualized in 74 patients; normal bile ducts were seen in 14. In all 60 patients with obstruction, the biliary tree and the obstruction were disclosed by the procedure, and the diagnosis was verified at surgery and/or autopsy. Complications (including bile lead and bleeding) occurred in four patients, but were not exclusively due to the procedure. The incidence of complications may be limited if the technique is meticulously followed.

3048 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY USING THE "CHIBA" NEEDLE--80 CASES.

(Eng.) Jain, S.; Long, R. G.; Scott, J.; Dick, R.; Sherlock, S. (Royal Free Hosp., Hampstead, London NW3 2QG, England). *Br. J. Radiol.* 50(591):175-180; 1977.

The Chiba needle was used for percutaneous transhepatic cholangiography in 80 patients with cholestatic jaundice in whom p.o. or i.v. cholangiography was impossible or in whom these procedures had proved unsatisfactory. The bile ducts were visualized radiographically in 80% of the patients. The success rate was 94.4% in the 54 patients with dilated bile ducts due to an extrahepatic biliary obstruction, and 50% in the 20 patients with undilated ducts. Four patients developed ascending cholangitis with septicemia on the same day as the procedure; early surgery after visualization of obstructed bile ducts is recommended. The technique was successful in three of five patients with sclerosing cholangitis. Percutaneous cholangiography with a Chiba needle is a convenient method of opacifying the biliary system in patients with severe large bile duct obstruction.

3049 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE MANAGEMENT OF PANCREATIC AND BILIARY DISEASE.

(Eng.) Mullens, J. E.; Laufer, I. (McMaster Univ. Medical Centre, 1200 Main St. W., Hamilton, Ontario L8S 4J9, Canada). *Can. J. Surg.* 19(5):405-409; 1976.

Endoscopic retrograde cholangiopancreatography (ERCP) in the management and diagnosis of pancreatic and biliary disease is reviewed. The indications for ERCP include obstructive jaundice, chronic or recurrent pancreatitis, upper abdominal pain of obscure origin, and suspected pancreatic pseudocyst or upper abdominal mass. Contraindications include acute pancreatitis and some cases of cholangitis. Complications of ERCP include acute pancreatitis, cholangitis, and transmission of infectious disease. To prevent pancreatitis and cholangitis, the endoscopist must avoid overfilling the pancreatic and bile ducts. Endoscopic sphincterotomy of the sphincter of Oddi and the extraction of stones from the common bile duct are extensions of this procedure already in use. Cannulation of the bile ducts and pancreatic ducts in tests of secretion and cytology will become increasingly common applications of the technique.

3050 COMPARATIVE VALUE OF FOUR METHODS OF INVESTIGATING THE PANCREAS.

(Eng.) Wood, R. A. B.; Moossa, A. R.; Blackstone, M. O.; Bowie, J.; Collins, P.; Lu, C. T. (Pritzker Sch. Medicine, 950 East 59th St., Chicago, IL 60637). *Surgery* 80(4):518-522; 1976.

The comparative value of ultrasonography, radionuclide scanning, selective arteriography, and endoscopic retrograde cholangiopancreatography (ERCP) in the diagnosis of pancreatic cancer was studied in 89 patients. Fifty-eight patients underwent laparotomy, and 36 were found to have periampullary cancer; 7 had other malignant tumors within the abdomen, and 9 had pancreatitis on biopsy. Five patients had other benign diseases, and there was one negative laparotomy. Thirty-one patients who did not have laparotomy have shown no evidence of cancer at 1-yr follow-up. Among the patients with periampullary cancer, a correct-positive diagnosis was made in 19 of 25 examined with ultrasound, in 10 of 18 examined with radionuclide scanning, in 12 of 18 examined by arteriography, and in 18 of 21 examined with ERCP. Among the nine patients with pancreatitis, a correct-positive diagnosis was made in 5/9, 3/8, 3/9, and 5/7 patients using the respective procedures. The overall accuracy of ERCP was 88%, while that of ultrasound, pancreatic scan, and arteriography was 72%, 64%, and 64%, resp. Since ultrasonography involves no risks to the patient and is the most tolerable procedure, the authors suggest that it should be the first line of investigation in patients suspected of having pancreatic disease. ERCP, having the highest accuracy, should be the most advanced procedure for providing a definitive diagnosis.

3051 LYMPHOCYTE PROLIFERATION INHIBITORY FACTOR (PIF) IN ALCOHOLIC LIVER DISEASE.

(Eng.) Chen, T.; Leevy, C. M. (Martland Medical Center, Newark, NJ). *Clin. Exp. Immunol.* 26(1):42-45; 1976.

Lymphocyte proliferation inhibitory factor (PIF) was determined in the supernatants of phytohemagglutinin (PHA)-stimulated lymphocytes from alcoholic patients with normal liver (4), fatty liver (4), alcoholic hepatitis (6), and active Laennec's cirrhosis. PIF was assayed by determining inhibition of DNA synthesis in WI-38 human lung fibroblasts. PHA produced a 30- to 40-fold increase in the lymphocyte stimulation index, when added to lymphocytes from the patients with normal or fatty liver; there was only a 2- to 3-fold increase in this index when PHA was added to lymphocytes from patients with alcoholic hepatitis or active Laennec's cirrhosis. Autologous liver was without effect on the migration inhibition factor production in patients with normal (0.98 ± 0.8) and fatty liver (0.94 ± 0.11), but caused a significant decrease ($p<0.01$) in the migration inhibition index in patients with alcoholic hepatitis (0.73 ± 0.10) and active cirrhosis (0.74 ± 0.09). A twofold greater inhibition in thymidine incorporation into DNA by lung fibroblasts was observed in supernatants of PHA-stimulated lymphocytes from patients with alcoholic hepatitis or active Laennec's cirrhosis than from patients with normal or fatty liver. Decreased liver cell regeneration seen in some patients with alcoholic hepatitis may be due to increased elaboration of PIF.

3052 MODERN ASPECTS OF X-RAY DIAGNOSIS IN GASTROENTEROLOGY. (Ger.) Frik, W. (Abteilung Radiologie, Medizinische Fakultat, Rheinisch-Westfalische Technische Hochschule, Aachen, Goethestrasse 27-29, D-5100 Aachen, W. Germany). *Med. Klin.* 72(3):73-78; 1977.

3053 ELECTRICAL MALFUNCTION AT ENDOSCOPY. POSSIBLE CAUSE OF ARRHYTHMIA AND DEATH. (Eng.) Switz, D. M.; Clarke, A. M.; Longacher, J. W., Jr. (P.O. Box 908, Medical Coll. Virginia, Richmond, VA 23298). *JAMA* 235(3):273-275; 1976.

3054 PERITONEOSCOPY MORBIDITY: NATIONAL ENQUIRY. (Fre.) Paolaggi, J. A.; Debray, Ch. (Hopital Bichat, 170, bd Ney, 75877 Paris Cedex 18, France). *Ann. Gastroenterol. Hepatol.* 12(5):335-343; 1976.

3055 A NEW PROTOTYPE 2-CHANNEL UPPER GASTROINTESTINAL OPERATING FIBERSCOPE. (Eng.) Gaisford, W. D. (508 East South Temple, Salt Lake City, UT 84102). *Gastrointest. Endosc.* 22(3):148-150; 1976.

3056 RADIOLOGY AND ENDOSCOPY IN ACUTE UPPER GASTROINTESTINAL BLEEDING. (Eng.) Fraser, G. M.; Rankin, R. N.; Cummack, D. H. (Western General Hosp., Edinburgh, EH4 2XU, Scotland). *Br. Med. J.* 1(6004):270-271; 1976.

3057 FETAL ANTIGENS IN HUMAN DIGESTIVE TUMORS. (Eng.) Martin, F.; Martin, M. S.; Bourgeaux, C. (INSERM, U-45, Faculte de Medecine, Boulevard Jeanne d'Arc, Dijon, France). *Eur. J. Cancer* 12(3):165-175; 1976.

3058 CARCINOEMBRYONIC ANTIGEN-LIKE SUBSTANCE IN GASTRIC JUICE. (Eng.) Vuento, M.; Ruoslahti, E.; Pihko, H.; Svenberg, T.; Ihamaki, T.; Siurala, M. (Dept. Biochemistry, Univ. Helsinki, Finland). *Immunochemistry* 13(4):313-316; 1976.

3059 DIAGNOSTIC SIGNIFICANCE OF GASTRINAEMIA. (Eng.) Barbara, L. (Istituto di Clinica Medica e Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 7(3):245-247; 1975.

3060 BASAL AND POSTPRANDIAL GASTRINEMIA DETERMINATIONS: THEIR VALUE IN THE STUDY OF GASTRIC DISEASES OTHER THAN THE ZOLLINGER-ELLISON SYNDROME. (Fre.) De Graef, J.; Woussen-Colle, M. C.; Willems, G. (Hopital Universitaire Saint-Pierre, Rue Haute 322, B-1000 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 39(7/8):225-235; 1976.

3061 PROGRESS IN OESOPHAGOSCOPY. (Eng.) Borgeskov, S.; Egedorf, J.; Kruse-Blinkenberg H. (Bispebjerg Hosp., Blegdamsvej 9, DK-2100 Copenhagen, Denmark). *Acta Otolaryngol. (Stockh.)* 82(1/2):151-156; 1976.

3062 THE ACCURACY OF RADIOLOGICAL AND COMPUTER DIAGNOSES IN SMALL BOWEL EXAMINATIONS IN CHILDREN. (Eng.) Jeans, W. D.; Morris, A. F. (Dept. Radiodiagnosis, Univ. Bristol, Bristol, England). *Br. J. Radiol.* 49(584):665-669; 1976.

3063 DOUBLE CONTRAST EXAMINATION OF THE COLON WITH GLUCAGON: METHOD AND RESULTS. (Ger.) Jungk, K. (Rontgenabteilung des Allgemeinen Krankenhauses, 2000 Hamburg-Eilbek, W. Germany). *Roentgenblaetter* 30(1):8-14; 1977.

3064 PANORAMIC POLYDIRECTIONAL COLOFIBROSCOPY AND BIOPSY THROUGH COLOSCOPE. (Fre.) Stoichita, S. (Inst. Medicine and Pharmacy, Buchare Rumania). *Ann. Gastroenterol. Hepatol.* 12(7):501-509; 1976.

3065 A NEW FIBERINTESTINOSCOPE TYPE FIS-T$_1$ PATTERNED AFTER INTESTINAL BIOPSY TUBE. (Eng.) Mita, M.; Wong, T. F.; Yamagata, R.; Matsumoto, K.; Tachikawa, H.; Sugawara, T.; *et al.* (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohok J. Exp. Med.* 118(Suppl.):111-116; 1976.

3066 RADIOGRAPHIC SURVEY FOR EXTRALUMINAL AIR FOLLOWING GASTROINTESTINAL TRACT FIBERENDOSCOPY. (Eng.) Glouberman, S.; Craner, G. E.; Ogburn, R. M.; Burdick, G. E. (613 West Palmaire, Phoenix, AZ 85021). *Gastrointest. Endosc.* 22(3):165-167; 1976.

3067 FIBEROPTIC COLONOSCOPY. (Eng.) Smith, J. H.; Roberts, G. W.; Ohan, A. H. (4100 Frawley Drive, Fort Worth, TX 76118). *Tex. Med.* 72(1):90-97; 1976.

3068 FIBEROPTIC COLONOSCOPY IN CHILDREN [Abstract]. (Eng.) Liebman, W. M. (Univ. California Medical Center, San Francisco, CA). *Cl Res.* 25(2):174A; 1977.

3069 COLONOSCOPY: DIAGNOSTIC AND THERAPEUTIC USES. (Eng.) Appel, M. F. (Baylor Coll Medicine, 6624 Fannin, Houston, TX 77025). *Tex. M* 72(2):75-78; 1976.

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3118 A NEW METHOD FOR THE RADIOLOGICAL OPACIFICATION OF THE PANCREAS. (Eng.) Yoshimoto, S.; Doi, S.; Arao, M.; Kawai, K. (Nishinomiya Pref. Hosp., Rokutanji-cho, Nishinomiya, Japan). *Endoscopy* 8(3):154-160; 1976.

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3120 COMPARISON OF FIBERENDOSCOPY FINDINGS IN WIRSUNG'S CANAL AND THE RADIOSURGICAL OPACIFICATION OF THE PANCREATIC DUCTS. (Fre.) Leger, L.; Liguory, C. (Hopital Cochin, 27, rue du faubourg Saint-Jacques, 75014 Paris, France). *Rev. Fr. Gastroenterol.* (125):9-13; 1977.

3121 BEHAVIOR OF AMYLASEMIA IN RELATION TO GLYCEMIC VARIATIONS IN NORMAL SUBJECTS AND IN CHRONIC PANCREOPATHIC PATIENTS. (Ita.) Scopinaro, N.; Pandolfo, N.; Gianetta, E.; Caponnetto, A. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica B Univ., Genova, Italy). *Minerva Gastroenterol.* 22 (2):141-148; 1976.

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3123 CLINICAL VALUE OF DETERMINATION OF CERTAIN ENZYMES AND ISOENZYMES IN ACUTE PANCREATITIS. (Pol.) Rokicki, M.; Rokicki, W. (Zaklad Biochemii Instytutu Biol.-Fizjol. Sl. Ak. Med., ul. K. Marksa 19, 41-808 Zabrze, Poland). *Wiad. Lek.* 29(20):1823-1827; 1976.

See also, 2833, 2993, 2997, 3003, 3127, 3128, 3136, 3147, 3149, 3161, 3166, 3179, 3200, 3201, 3206, 3207, 3218, 3248, 3249, 3257, 3285, 3288, 3291, 3301, 3307, 3320, 3325, 3328, 3329, 3330, 3334, 3336, 3343, 3344, 3345, 3346, 3361, 3363, 3376, 3377, 3383, 3408, 3411, 3435, 3439, 3451, 3470, 3490, 3504, 3512, 3529, 3541, 3562.

GASTROINTESTINAL DISEASES

ESOPHAGUS

3124 ACHALASIA IN THREE SIBLINGS: A RARE OCCURRENCE.

(Eng.) London, F. A.; Raab, D. E.; Fuller, J.; Olsen, A. M. (Permanente Medical Group, San Francisco, CA). *Mayo Clin. Proc.* 52(2):97-100; 1977.

The case reports of three brothers with achalasia are presented. The first patient initially experienced symptoms of esophageal obstruction when he was 34, the second brother developed symptoms at 56, and the third at age 60 yr. The diagnosis of classic achalasia was confirmed in each brother by roentgenologic examination and by esophageal motility studies. Two patients were successfully treated by forceful dilation of the lower esophageal sphincter, and the third by esophagomyotomy. None of the 10 siblings of the three brothers had esophageal disorders, nor did any of the children of the patients. Although the patients were raised in the same home and all worked in iron mines, it appears unlikely that environmental factors were responsible for the development of this disease. The etiology of achalasia in siblings remains obscure, but a genetic origin (autosomal recessive) seems most likely.

3125 Candida ESOPHAGITIS: A PROSPECTIVE STUDY OF 27 CASES.

(Eng.) Kodsi, B. E.; Wickremesinghe, P. C.; Kozinn, P. J.; Iswara, K.; Goldberg, P. K. (Maimonides Medical Center, 4802 10th Ave., Brooklyn, NY 11219). *Gastroenterology* 71(5): 715-719; 1976.

A prospective study of *Candida* esophagitis was undertaken to determine the spectrum of this disease in a general hospital. Twenty-seven cases of *Candida* esophagitis occurred in 370 consecutive endoscopies performed in 1 yr. The diagnosis was established by finding white plaques on endoscopy, yeast organisms on microscopic examination of a direct smear from the plaques, and a serum agglutinin titer of at least 1:160. Of these 27 patients, 14 had esophageal symptoms. Twelve patients were reendoscoped after nystatin or nystatin and flucytosine therapy. Nine patients showed absence of lesions, a negative smear, and disappearance of symptoms. Control patients had no plaques on endoscopy, no yeast organisms on microscopical examination of esophageal brushings, and a positive titer in 4 to 17% of cases. A minimal agglutinin titer of 1:160 was found in 4-12% of two additional groups of controls. The absence of titer precluded a diagnosis of *Candida* esophagitis.

3126 RESULTS OF HELLER'S OPERATION FOR ACHALASIA OF THE OESOPHAGUS. THE IMPORTANCE OF HIATAL REPAIR.

(Eng.) Black, J.; Vorbach, A. N.; Collis, J. L. (Queen Elizabeth Hosp., Birmingham, England). *Br. J. Surg.* 63(12):949-953; 1976.

The results of cardiomyotomy for the repair of esophageal achalasia were evaluated in 108 patients, 55 of whom also underwent some type of hiatal reconstruction. Eleven of the latter patients underwent a formal plastic repair practiced for esophage reflux problems, while the remaining 44 patients underwent anterior crural suture. All operations were done by the abdominal approach, and all patie were followed up for a minimum of 4 yr. Seventy-o patients had entirely satisfactory results. Twent seven patients had recurrent dysphagia, and 20 patients had symptoms of reflux esophagitis. None of the 11 patients who underwent formal repair of the hiatus had reflux symptoms or dysphagia. Twen four of the 44 patients who had anterior suture an 36 of the 53 patients who underwent cardiomyotomy alone were asymptomatic 4 yr after the operation. Mild to severe reflux occurred in 11 patients with anterior suture and in 9 patients with cardiomyoto alone. The results suggest that much of the dysph following Heller's operation is due to occult gast esophageal reflux and can be avoided by a reflux-preventing procedure. Adequate hiatal repair afte myotomy is recommended.

3127 ESOPHAGEAL INTRALUMINAL pH RECORDING IN THE ASSESSMENT OF GASTROESOPHAGEAL REFLU AND ITS CONSEQUENCES.

(Eng.) Atkinson, M.; Van Gelder, A. (General Hosp., Nottingham NG1 6HA, England). *Am. J. Dig. Dis.* 22(4):365-370; 1977.

Intraluminal pH was determined in the lower esopha gus during a 3-hr period following a light meal an a consecutive 12-hr nocturnal period in 20 patient with typical symptoms and radiological evidence of gastroesophageal reflux and in 10 patients without such signs. Evidence of acid reflux was obtained in three patients without reflux during the postcibal period, but in only one during the nocturnal period. In contrast, 19 patients with evidence of reflux showed spells of high acidity, both in the postcibal and nocturnal periods. There was no clear correlation between the frequency of pain from gastroesophageal reflux over the preceding 2 weeks and the duration of high acidity in the nocturnal period. Those patients with endoscopic evidence of severe esophagitis showed a significantly longer duration of high esophageal acidity in the nocturnal period. Nocturnal exposure of th esophageal mucosa to acid is a major factor in the causation of reflux esophagitis.

3128 VALUE OF MERCURIC CHLORIDE SCINTIGRAPHY IN THE DIAGNOSIS OF ESOPHAGEAL CANCER.

(Fre.) Asperge, A. (Universite Claude-Bernard, Lyon I, France). *Rev. Fr. Gastroenterol.* (124): 61-62; 1976.

3129 A CASE OF EARLY GASTRIC CANCER ASSOCIATE WITH ESOPHAGEAL CARCINOMA.

(Jpn.) Yait A.; Nakamura, T.; Sugimachi, K.; Mine, H.; Okudair Y.; Inokuchi, K.; *et al.* (Sch. Medicine, Kyushu Univ., Japan). *Jpn. J. Cancer Clin.* 21(6):421-426 1975.

130 ESOPHAGOTRACHEAL FISTULA DUE TO CARCINOMA OF THE ESOPHAGUS. (Jpn.) Okamoto, Y.; washima, O.; Watari, T.; Machida, K. (Tokyo Univ. ranch Hosp., Tokyo, Japan). *Jpn. J. Cancer Clin.* (10):815-821; 1975.

131 ESOPHAGEAL LOCALIZATION OF DARIER'S DISEASE. RADIOLOGICAL DESCRIPTION. PORT OF FOUR CASES. (Fre.) Larregue, M.; squet, C.; Lansmann, M.; Katz, M. (Hotel-Dieu 86000 Poitiers, France). *Ann. Radiol. (Paris)* (8):765-768; 1976.

32 VASCULAR ORIGIN OF DYSPHAGIA. (Fre.) Sadeghi, H.; Morin, D. (Departement de rdiologie des Services universitaires de medecine de chirurgie, CHUV-1011 Lausanne, Switzerland). *v. Fr. Gastroenterol.* (124):19-26; 1976.

33 CORROSIVE ESOPHAGITIS. (Fre.) Morgon, A.; Gregoire, D.; Romanet, P. (Hopital E.-rriot, Lyon, France). *Rev. Fr. Gastroenterol.* 24):33-36; 1976.

34 ON GASTROESOPHAGITIS FROM BILIARY REFLUX IN GASTRORESECTED PATIENTS. (Ita.) Vadala, ; Platania, P.; Occhiato, V.; Cali, R. (I^{a} Clinica irurgica Generale e Terapia Chirurgica della iversita di Catania, Italy). *Chir. Ital.* 28(3): 1-209; 1976.

3135 ACTION OF THYROCALCITONIN ON THE LOWER ESOPHAGEAL SPHINCTER CONTRACTION INDUCED BY PENTAGASTRIN IN NORMAL MEN AND IN THOSE WITH IDIOPATHIC MEGA-ESOPHAGUS. (Fre.) Debat, J.; Couturier, D.; Roze, C.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 9:301-302; 1976.

3136 INSTRUMENTAL ESOPHAGEAL PERFORATIONS--DIAGNOSIS AND TREATMENT. (Ger.) Seitz, W.; Gamstatter, G.; Kloss, R. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Med. Klin.* 72(8):306-311; 1977.

3137 SCLEROSIS OF THE ESOPHAGEAL WALL DUE TO ACUTE, CONSERVATIVELY UNCONTROLLABLE AND IMMINENT HEMORRHAGE FROM VARICES. (Ger.) Paquet, K. J.; Busing, V.; Kliems, G. (Chirurgische Universitatsklinik, 5300 Bonn 1, Venusberg, W. Germany). *Dtsch. Med. Wochenschr.* 102(2):59-61; 1977.

See also, 2697, 2735, 2749, 3040, 3061, 3149, 3190, 3213, 3547.

STOMACH

38 POTENTIAL DIFFERENCE ACROSS THE NORMAL AND THE ABNORMAL GASTRIC MUCOSA IN MAN. (Eng.) ssenbocus, A.; Fitzpatrick, P.; Colin-Jones, D. G. rincess Alexandra Hosp., Woolloongabba, Brisbane, eensland, Australia). *Gut* 17(12):993-997; 1976.

e mucosal potential difference in the body of the omach was measured in 18 patients with gastric cers, 5 with gastritis, and 3 with pernicious emia and in 12 normal volunteers. The 12 normal bjects had a mean potential difference of -45.7 ± 6 mV. These levels were significantly lower in e patients with gastric ulcer (-32.4 ± 0.7 mV, 0.001), gastritis (-33.6 mV, $p<0.001$), and percious anemia (-35, -29, and -23 mV). In the 25 ditional patients, biopsies were taken and potenal difference was measured in the duodenal bulb d at five sites in the stomach to obtain a more rect correlation between histology and potential fference. The six patients with gastritis at the gh lesser curve had a significantly lower potenal difference (-4.8 mV) than did the patients thout gastritis at the same site (-15.8 mV, 0.01). In the latter group, the potential difrence at the high lesser curve was as low as that the antrum, and was invariably lower than that the high greater curve. This may imply an ineased permeability in the high lesser curve.

3139 ANTRAL GASTRIN CELLS: A CORRELATION BETWEEN THE NUMBER OF GASTRIN CELLS AND THE TOTAL CONCENTRATION OF GASTRIN IN SERUM AND IN ANTRAL MUCOSA. A PILOT INVESTIGATION. (Eng.) Asnaes, S.; Bjerregaard, B.; Malmstrom, J.; Hansen, O. H.; Hardt, F.; Johansen, A. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Scand. J. Gastroenterol.* 11(5):471-474; 1976.

Studies were carried out in 52 patients with different gastric diseases to correlate the number of gastrin-producing (g) cells with the gastrin concentration in the serum and in the antral mucosa. The gastrin cell number was determined by immunohistological staining of biopsies from the antral mucosa. In severe chronic gastritis, the pyloric mucosa contained few g-cells, whereas in normal and nonatrophic gastritis there were many g-cells. In pyloric mucosa containing few g-cells, the gastrin content (median, 4.8 µg/g tissue) was significantly lower ($p<0.01$) than that in pyloric mucosa containing many g-cells (median, 23.4 µg/g). The circulating fasting gastrin level was also significantly higher in the patients whose pyloric mucosa contained many g-cells (112 µg/ml) than in those whose mucosa contained few g-cells (44 µg/ml, $0.05>p>0.02$). It is not yet possible to estimate the total g-cell mass and thereby compare different clinical groups.

3140 EFFECT OF INTRADUODENAL ACID ON THE PRE- AND POST-VAGOTOMY BASAL GASTRIC SECRETION AND GASTRIN. (Eng.) Linares, C. A.; Falasca, C. A.; Sartorio, G. C.; Soto, R. J. (Univ. Buenos Aires Sch. Medicine, Aguero 1540-5, Buenos Aires, Argentina). *Surgery* 81(4):392-398; 1977.

Basal gastric secretion was studied in 10 normal subjects, 8 preoperative duodenal ulcer patients, 14 patients who had undergone truncal vagotomy and pyloroplasty, and 6 patients with highly selective vagotomies. Duodenal acidification lowered the gastric secretion and gastrin levels of normal subjects and preoperative ulcer patients. After both truncal and selective vagotomies, acid instillation did not inhibit gastric secretion, even when surgery had been performed 3 or more yr previously, but there was a decrease in gastrin levels. These results suggest that the secretory mechanism has a hormonal component mediated through the release of an enterogastrone, and a nervous one with vagal dependence. An intact gastric vagal innervation seems necessary to preserve sensitivity to hormonal inhibitors, whereas duodenal innervation does not influence inhibition. Highly selective vagotomy, therefore, does not appear to have any advantages over truncal section.

3141 EFFECT OF BETAZOLE ON SERUM GROUP I PEPSINOGEN LEVELS: RELATIONSHIP TO GASTRIC ACID OUTPUT IN UNOPERATED AND POSTOPERATIVE PATIENTS. (Eng.) Samloff, I. M.; Secrist, D. M.; Passaro, E., Jr. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *Gastroenterology* 72(5, Part 1):845-848; 1977.

The effect of betazole on serum group I pepsinogen (PG I) levels and gastric acid output was compared in 245 unoperated patients (115 duodenal ulcer, 25 prepyloric ulcer, 32 gastric ulcer, 73 nonulcer) and 73 symptomatic postoperative patients (15 subtotal gastric resection, 28 vagotomy and gastric resection, 30 vagotomy and drainage). A negative serum PG I response (2-hr serum PG I level <92% of basal) occurred in 10 (4.1%) unoperated patients and in 31 (42.5%) postoperative patients. Seven (70%) of the former and 29 (93.5%) of the latter patients had a peak acid output of less than 10 mEq/hr, indicating that a negative serum PG I response is associated with a low peak acid output in both unoperated and postoperative patients. The peak acid output was greater than 10 mEq/hr in 93.1% of the 277 patients with a 2-hr serum PG I level of more than 92% of basal. Additional studies revealed that neither aspiration of gastric juice nor perfusion of the stomach with acid altered the serum PG I response. This suggests that topical acid does not modulate the effect of betazole on serum PG I levels. Finally, a negative serum PG I response has been shown to be paradoxical, in that gastric pepsin levels increase over basal levels concurrently with the decrease in serum PG I levels.

3142 GASTRIN LEVELS AND GASTRIC ACIDITY IN THE PATHOGENESIS OF ACUTE GASTRODUODENAL DISEASE AFTER BURNS. (Eng.) Rosenthal, A.; Czaja, A. J.; Pruitt, B. A. (Brooke Army Medical Center, Fort Sam Houston, TX). *Surg. Gynecol. Obstet.* 144(2): 232-234; 1977.

To define the pathogenetic relation between gastric acid secretion, serum gastrin, and acute gastr duodenal disease after burns, unstimulated gastric analyses were correlated with the findings of gastr duodenoscopy in 31 hemodynamically stable burned patients. Twenty-two patients had acute gastroduoden disease. Diffuse, superficial, gastroduodenal erosions were present in 17 patients; 5 additional patients had ulcerative lesions. Gastrin levels coul not be correlated with the incidence, severity or location of gastroduodenal disease. However, the mean gastric acidity was highest in patients with ulcerative disease (8.53 ± 4.96 mEq/hr), intermedia in those with superficial disease (2.80 ± 0.66 mEq/hr), and lowest in the nine patients with no diseas (1.19 ± 0.38 mEq/hr; correlation coefficient, $r = 0.41$, $p<0.05$). There was no correlation between the serum gastrin levels and gastric acid secretio The relative hyperacidity in patients with acute gastroduodenal disease suggests that acid may be o of the factors potentiating mucosal injury in these patients and may be particularly important in the evolution of life-threatening ulceration.

3143 AUTOIMMUNE ATROPHIC GASTRITIS WITH HYPERGASTRINEMIA. (Eng.) Reinhardt, J. D.; McCloy, R. M.; Blackwell, C. F. (Baptist Memorial Hosp., 899 Madison Ave., Memphis, TN 38146). *Sout Med. J.* 69(12):1551-1553; 1976.

The cases of three patients with chronic atrophic gastritis, achlorhydria, and parietal cell antibodies in the serum in whom elevated fasting level of serum gastrin were found are reported. The patients were women, ranging in age from 40 to 55 yr They were evaluated for persistent upper abdominal pain, without radiographic evidence of peptic ulce disease. Fiberoptic endoscopy revealed characteristic changes of chronic atrophic gastritis (i.e., diffuse chronic inflammation of the lamina propria and decreased numbers of parietal cells in the mucosa). Total achlorhydria was demonstrated afte a maximal histalog stimulus; however, serum levels of vitamin B_{12} and Schilling test values were norm in all three patients. Parietal cell antibodies were found in the serum in all patients in a dilution of 1:20-1:80. These cases represent autoimmu (type A) chronic atrophic gastritis and should be distinguished from chronic simple (type B) gastrit in which serum gastrin levels are normal and no parietal cell antibodies are found in the serum. Patients with autoimmune gastritis should be obser at frequent intervals for the occurrence of pernicious anemia or gastric carcinoma.

3144 GASTRIC MUCOSAL POLYPS IN PERNICIOUS ANAEMIA. (Eng.) Elsborg, L.; Andersen, Myhre-Jensen, O.; Bastrup-Madsen, P. (Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(1):49-52; 1977.

Because of the high frequency of gastric polyps a gastric cancer among patients with pernicious anemia, 68 pernicious anemia patients were examined gastroscopically at regular intervals (3-6 months) for 4 yr. Biopsies were taken from the antral mucosa just orad to the pylorus and from the fundal mucosa just below the cardia; four or five biopsies were taken from each gastric polyp. Atrophic gastritis was confirmed in 91% of biopsied patients, and intestinal metaplasia of superficial epithelium and/or gland epithelium was found in one or more biopsy specimens in 54 of the 60 patients with atrophic gastritis. Gastric polyps not exceeding 2 cm in diameter, often with a slightly eroded surface, were seen in 25 patients. Multiple polyps were found in only nine of these patients. Follow-up examinations showed complete disappearance of the polyps in nine patients within a year or two, while the number of polyps was reduced during the observation period in two patients. New polyps were observed in five patients in whom gastroscopic examination had initially failed to reveal polyps. The number of previously observed polyps was increased in three patients. None of the polyps seen in the 25 patients underwent malignant transformation during the 4-yr period; by histological examination, they were classified as non-neoplastic "regenerative" benign polyps in an atrophic gastric mucosa. The authors conclude that if polyps of this type are asymptomatic and do not give rise to any mechanical obstruction, they can safely be followed up once or twice a year until disappearance occurs.

3145 DRUG THERAPY FOR POSTVAGOTOMY GASTRIC STASIS.

(Eng.) Sheiner, H. J.; Catchpole, B. N. (Perth Medical Center, Shenton Park, 6008, Perth Western Australia). *Br. J. Surg.* 63(8):608-611; 1976.

Therapy with bethanechol chloride and metoclopramide was assessed in six patients presenting with severe symptoms of gastric retention both in the early and late periods following truncal vagotomy with a drainage procedure. Therapy was initiated after mechanical obstruction of the gastric outlet was excluded by radiology. The administration of bethanechol chloride (2.5 mg, s.c.) produced gastric peristalsis in all patients, although three patients required a second dose. Improvement of symptoms occurred in five subjects. Two i.v. injections of 10 mg of metoclopramide (within a 15-min period) produced no peristalsis when given alone. In one patient, however, metoclopramide increased the gastric contractions that had been initiated by bethanechol.

3146 PYLORIC STENOSIS IN THE OXFORD RECORD LINKAGE STUDY AREA.

(Eng.) Adelstein, P.; Fedrick, J. (Dept. Regis Professor of Medicine, Oxford Univ., England). *J. Med. Genet.* 13(6):439-448; 1976.

The Oxford Record Linkage Study files (1966-1971) were used to identify 220 infants presenting with hypertrophic pyloric stenosis (IHPS), and the increased risk of recurrence within families was studied (siblings born 1965-1972). The overall incidence is 2.56 per 1,000 live births (222/82,761 cases). The study was undertaken to identify the relationship of environmental factors with genetic make-up in the development of IHPS. Male infants (186/220 cases) were at higher risk than female infants; the male to female ratio was 5.47:1. There was no variation in birth weight, and only among the females was a lack of premature pyloric infants ($p>0.01$) seen. There was an inverse relation between gestation and age on admission of the infant to hospital. There was a distinct seasonal variation in time of birth, with highest incidence occurring in infants born in July-September. A variation in incidence with geographical area of residence was seen. The cities (1.98/1,000 infants) had lower rates of IHPS than the adjacent rural (2.58/1,000 infants) or small urban (2.92/1,000 infants) areas. The highest incidence was reported in the town of Wallingford (9.3/1,000 cases). The risk of IHPS was not greatest among firstborns, but among second children (85/1,000 cases). Of the other major factors studied, maternal age (20-24 yr), social class (upper), and rhesus-negative mothers ($p<0.02$) showed a definite association with incidence of IHPS. Legitimacy, religion, maternal origin, and blood group were not correlated with the incidence of IHPS.

3147 GASTRIC VARICES WITHOUT ESOPHAGEAL VARICES. AN IMPORTANT PREENDOSCOPIC DIAGNOSIS.

(Eng.) Rice, R. P.; Thompson, W. M.; Kelvin, F. M.; Kriner, A. F.; Garbutt, J. T. (Duke Univ. Medical Center, Durham, NC 27710). *JAMA* 237(18):1976-1979; 1977.

The cases of four patients with gastric varices presenting as a fundal mass without any demonstrable esophageal varices are presented. The first three patients (a 40-yr-old woman, a 61-yr-old man, and a 42-yr-old man) had histories of alcoholism. All patients presented with upper gastrointestinal or rectal bleeding. The first patient had severe chronic pancreatitis and died from hemorrhage of one of the pancreatic vessels. The finding of fundal varices by upper gastrointestinal examination was confirmed at autopsy. The second patient had a 25-yr history of recurrent upper gastrointestinal hemorrhage. The presence of fundal varices was confirmed by an upper gastrointestinal series and angiography. The splenic vein was patent, and there was evidence of chronic hepatitis. Although there was a history of heavy alcohol consumption in the past, there was no cirrhosis. Angiography showed no anastomoses between the gastric and retroperitoneal veins. In the third patient, angiography showed a large spleen, with splenic vein obstruction and large gastric varices. A liver biopsy specimen demonstrated cirrhosis. Endoscopy showed prominent folds in the fundus, with intact mucosa. The fourth patient, a 22-yr-old woman with no history of alcohol consumption, had a 13-yr history of abdominal pain. She had guaiac-positive stools and a low hemoglobin level. An abdominal roentgenogram demonstrated gross pancreatic calcification. Upper gastrointestinal studies demonstrated filling defects in the fundus. The appearance of the varices in this patient was round, smooth submucosal projections; in the other three patients, the varices had the appearance of a polypoid mass in the posterior aspect of the fundus. In patients 3 and 4, a double contrast examination of the stomach was done using high-density barium and gas-releasing tablets. This technique was superior to the conventional barium meal in that it was easier to determine whether the mucosa was intact. The roentgenographic demonstration of submucosal polypoid filling defects in the fundus of patients with pancreatic or liver disease should suggest gastric varices, even in the absence of esophageal varices.

3148 ABSORPTION OF GLUCOSE FROM THE STOMACH: PRELIMINARY REPORT. (Jpn.) Miwa, T.; Tani, N.; Harasawa, S.; Suzuki, S.; Sikita, T. (Sch. Medicine, Tokai Univ., Japan). *Jpn. J. Gastroenterol.* 73(2):152-156; 1976.

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3152 LIVER DAMAGE AFTER RESECTION OF THE STOMACH: EVALUATION OF 215 CASES. (Ger.) Kautzsch, E. (Stadtisches Krankenhaus Munchen-Oberfohring, Oberfohringer Strasse 156, D-8000 Munchen 81, W. Germany). *Med. Klin.* 72(12):501-504; 1977.

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3158 FIBROUS BOWEL ADHESION SIMULATING RECURRENC OF HODGKIN'S DISEASE. (Eng.) Cacciarelli, A. A.; McAlister, W. H.; Ternberg, J. L. (No affiliation given). *J. Pediatr. Surg.* 11(1):95-96; 1976.

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Tonnelle, 37000 Tours, France). *Sem. Hop. Paris* 53(4):247-251; 1977.

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3190 GASTRIC ULCERATION WITHIN HIATUS HERNIA. (Eng.) Hocking, B. V.; Alp, M. H.; Grant, A. K. (Queen Elizabeth Hosp., Woodville Road, Woodville, South Australia 5011). *Med. J. Aust.* 2(6): 207-208; 1976.

3191 MORPHOLOGICAL FEATURES AND HEALING OF STRESS ULCERS INDUCED BY ALCOHOL AND RESTRAINT. (Eng.) Lev, R.; Kawashima, K.; Glass, G. B. J. (New York Medical Coll., Valhalla, NY 10595). *Arch. Pathol. Lab. Med.* 100(10):554-558; 1976.

3192 LARGE GASTRIC VARIX SIMULATING TUMOR. (Eng.) Marshak, R. H.; Maklansky, D.; Lindner, A. E. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Am. J. Gastroenterol.* 66(6):566-567; 1976.

See also, 2799, 2813, 2815, 2818, 2823, 2831, 2964, 2998, 3002, 3009, 3039, 3040, 3053, 3055, 3056, 3057, 3058, 3060, 3079, 3080, 3081, 3082, 3084, 3085, 3086, 3127, 3129, 3134, 3154, 3199, 3204, 3206, 3207, 3210, 3211, 3225, 3268, 3314, 3327, 3352, 3532, 3541, 3546, 3547.

STOMACH

Peptic Ulcers

3193 HISTAMINE AND PEPTIC ULCER: A PROSPECTIVE STUDY OF MUCOSAL HISTAMINE CONCENTRATION IN DUODENAL ULCER PATIENTS AND IN CONTROL SUBJECTS SUFFERING FROM VARIOUS GASTROINTESTINAL DISEASES. (Eng.) Troidl, H.; Lorenz, W.; Rohde, H.; Hafner, G.; Ronzheimer, M. (Chirurgische Univ.-Klinik, Robert-Koch-Str. 8, D-3550 Marburg a.d. Lahn, W. Germany). *Klin. Wochenschr.* 54(19):947-956; 1976.

A prospective study of histamine content of the body of the stomach was carried out in 31 controls, 18 patients with duodenal ulcer, and 51 patients with various gastrointestinal diseases. The median histamine content was 43 μg/g in normal male controls, while in duodenal ulcer patients, the levels were significantly lower by about 30%. In the other patients (gastric ulcer, hiatal hernia, gastric carcinoma, cholecystitis, gastric erosions, Zollinger-Ellison syndrome, atrophic gastritis, pancreatitis, esophageal varices due to portal vein cavernoma, and alimentary obesity), the median histamine concentrations in gastric mucosa ranged between 13.3 and 95.8 μg/g. Since in most species it is extremely difficult to alter the mucosal histamine concentration by any form of treatment, the diminished histamine content of the gastric mucosa in patients with duodenal ulcer seems remarkable. Among several possible explanations, the most likely is that histamine release is increased in duodenal ulcer disease.

3194 HISTAMINE AND PEPTIC ULCER DISEASE: HISTAMINE METHYLTRANSFERASE ACTIVITY IN GASTRIC MUCOSA OF CONTROL SUBJECTS AND DUODENAL ULCER PATIENTS BEFORE AND AFTER SURGICAL TREATMENT. (Eng.) Barth, H.; Troidl, H.; Lorenz, W.; Rhode, H.; Glass, R. (Surgery Clinic of the Univ., D-3550

Marburg/Lahn, Robert-Koch-Strasse 8, Marburg, W. Germany). *Agents Actions* 7(1):75-79; 1977.

Histamine methyltransferase (HMT) activity was determined by a modified isotope assay in biopsy specimens from gastric mucosa of 15 male control subjects, 18 male duodenal ulcer patients, and 20 male patients after various gastric operations. Enzymic activity of the control subjects, who were "healthy" with respect to their upper gastrointestinal tract, was 70.4 ± 12.8 pmol/(min/mg protein). In duodenal ulcer patients, HMT activity was significantly lowered by 15%; following selective vagotomy with pyloroplasty, a significant increase of 14% was observed, as compared to controls. The difference between values before (59.9 ± 13.3 pmol) and after (80.4 ± 11.7 pmol) this operation was highly significant ($p<0.001$). Experiments in a small number of patients showed that after other modifications of vagotomy, elevated HMT activities were also found; whereas after resection procedures, such changes of enzymic activity did not occur. The low gastric HMT activity of duodenal ulcer patients could play a role in the pathogenesis of a chronic peptic ulcer by being responsible for reduced histamine inactivation and, as a consequence, enhanced acid secretion. Vagotomy seemed to influence acid secretion in human subjects, not only by direct effects on the parietal cells, but also by an activation of histamine catabolism. One patient, who despite complete vagotomy showed both no reduction in acid secretion and a low gastric HMT activity, may be the representative of a new population of peptic ulcer patients.

3195 KINETICS OF DUODENAL ULCER HEALING: EFFECT OF TREATMENT WITH CIMETIDINE. (Eng.) Domschke, W.; Domschke, S.; Lux, G.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 23(6):441-443; 1976.

To study the kinetics of ulcer healing, ulcer size was assessed endoscopically before and after cimetidine or placebo therapy in a double-blind trial of 12 duodenal ulcer patients. The patients received cimetidine (200 mg, t.i.d., p.o.) or placebo, and endoscopy was performed at weekly intervals during treatment. Duodenal ulcer healing was significantly more rapid in cimetidine-treated patients than in those receiving the placebo ($p<0.0005$); the half-times of ulcer healing were about 6 days on cimetidine compared to about 20 days on placebo. No untoward clinical or laboratory effects (i.e., changes in hemoglobin, WBC count, neutrophils, platelets, blood-urea, alkaline phosphatase, SGOT, or SGPT) attributable to cimetidine were recorded in any patient between 0 and 4 weeks of treatment.

3196 CONTROLLED TRIAL OF DUOGASTRONE IN DUODENAL ULCER. (Eng.) Davies, W. A.; Reed, P. I. (Wexham Park Hosp., Slough, Berkshire, England). *Gut* 18(1):78-83; 1977.

A double-blind, placebo-controlled trial of carbenoxolone in a daily dose of 200 mg for 12 weeks was carried out in 40 ambulatory patients with endoscopically diagnosed duodenal ulcers; 34 of the patients were available for final analysis. Each patient was seen every 2 weeks and endoscoped at 4, 8, and 12 weeks. Serum carbenoxolone was measured at each visit. Complete ulcer healing occurred in a significantly greater number of patients receiving carbenoxolone than placebo, the significance being greater after 4 and 8 weeks of treatment ($p<0.01$) than at 12 weeks ($p<0.02$). While significant symptomatic improvement also was achieved ($p<0.05$) after 12 weeks on carbenoxolone, there was a much closer correlation between ulcer healing and symptom relief; 69% of the patients on carbenoxolone returned to normal, compared with 22% of controls ($p<0.02$). Rise of systolic blood pressure and reduction in serum potassium levels, especially during the last 4 weeks, were the most common effects noted in patients taking carbenoxolone, and five patients required thiazide diuretics and potassium supplements. Higher serum carbenoxolone levels were found in patients with healed ulcers, as well as in those with more marked side-effects. It is concluded that carbenoxolone is highly effective in healing duodenal ulcers.

3197 THE EFFECT OF METIAMIDE ON THE PROLONGED SERUM GASTRIN RESPONSE TO FEEDING OBSERVED IN PATIENTS WITH DUODENAL ULCER. (Eng.) Blair, E. L.; Grund, E. R.; Reed, J. D.; Sanders, D. J.; Thompson, M. H.; Venables, C. W. (Dept. Physiology, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Br. J. Surg.* 63(8):599-602; 1976.

The serum gastrin response to a meal was studied in 11 healthy controls and 16 patients with duodenal ulcer, and the effect of metiamide on this response was investigated. The ulcer patients consisted of nine patients with a mean ulcer history of 9 yr (group 2) and seven patients with an ulcer history of 10 yr (group 3). The mean serum gastrin concentration rose following the standard breakfast in normal subjects from a fasting value of 33.9 ± 6.8 pg/ml to a peak value of 69.4 ± 11.4 pg/ml within 1 hr of the end of the meal, and then fell progressively. By 3 hr of the end of the meal, the mean serum gastrin concentration was not significantly different from the fasting value. In group 2, the mean gastrin concentration increased from 45.6 ± 10.3 pg/ml to 80.8 ± 11.2 pg/ml in the first 15 min after the meal. In these patients, the peak concentration was sustained throughout the 3-hr test period. Group 3 patients had a similar response. The p.o. administration of labeled metiamide (300 mg; 25 μCi tritium/100 mg metiamide) in five group 3 patients had no effect on this response. It is concluded that the control of gastrin release is defective in duodenal ulceration, which may be due to a failure of the antral pH feedback mechanism. Gastrin may be a primary pathogenetic factor in duodenal ulceration.

3198 LONG-TERM EFFECTS AND AFTER-EFFECTS OF TREATMENT OF DUODENAL ULCER WITH METIAMIDE. (Eng.) Saunders, J. H. B.; Wormsley, K. G. (Dept.

Therapeutics, Univ. Dundee, Dundee, Scotland). *Lancet* 1(8015):765-767; 1977.

Three therapeutic regimens were investigated to determine the best way of treating duodenal ulceration with metiamide and cimetidine. Twenty patients received a 28-day course of metiamide (1 g/day); at the end of treatment the ulcers were determined to be healed endoscopically. Eight patients then received 400 mg of metiamide at night before sleep, while the remaining patients received placebo. This regimen did not prevent recurrence, and the median interval before the return of symptoms and endoscopic relapse was 7.5 months after cessation of full daily dose therapy; this was not significantly different from the interval in the patients receiving placebo. Another group of seven patients received metiamide throughout the day, as well as at night, in a dose of either 800 mg or 1 g/day, for 4-15 months. At the end of the first 28 days of treatment, all ulcers were healed, and recurrence was prevented by continued administration. Cessation of treatment was followed by rapid relapse or asymptomatic ulcer recurrence. Five additional patients received 1 g metiamide daily for 1 month, after which their ulcers were healed. The patients were followed at monthly intervals and re-endoscoped at the time of relapse; at this time, they received a further course of 1 g/day of metiamide or cimetidine for another month. Treatment was continued until ulcer healing was complete. In this group, the median time to relapse was 4 months after the first course of treatment and shortened significantly, to 2 months, after the second course of treatment. Symptomatic relief was slower in onset in response to the first course (2 days). The treatment of duodenal ulcer with H_2-receptor antagonists requires further investigation.

3199 ULTRASTRUCTURE OF PARIETAL CELLS BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY IN DUODENAL ULCER PATIENTS. (Eng.) Aase, S.; Roland, M.; Olsen, B. R. (Anatomical Inst., Univ. Oslo, Oslo, Norway). *Scand. J. Gastroenterol.* 11(1):55-64; 1976.

The ultrastructure of parietal cells before and after proximal gastric vagotomy (PGV) was studied in four duodenal ulcer patients to determine whether the reduced acid secretion, observed after PGV, is accompanied by intracellular changes in parietal cells. All patients showed a significant decrease in acid output, as well as in volume of gastric juice, after PGV. Stereological analysis of electron micrographs showed that the volume density of microvilli 10 days after PGV was significantly reduced by about 50%. There was a significant increase in the percent relative volume of the rough endoplasmic reticulum (from an average value of 0.8 to 2.9 after PGV). There was a significant decrease of about 55% in the secretory membrane surface. The surface density of the rough endoplasmic reticulum was also significantly increased. The most striking morphological feature 10 days after PGV was the appearance of membranous whorls and flattened sacs in the cytoplasm surrounding the intracellular canaliculi. Before PGV, tubulo-vesicular membranes were about 16,000 cm^2/cm^3; 10 days after PGV, the corresponding value was about 41,000 cm^2/cm^3. In most cells, the mitochondria appeared less dense, and their cristae were more easily distinguished, 10 days after PGV than before the procedure. Three months after the operation, the relative mitochondrial volume was about 37%; that of dense bodies was 6%; microvilli accounted for about 8%; and the rough endoplasmic reticulum accounted for less than 1% of the total cell volume. Compared with the value found before PGV, the increase in the relative volume of dense bodies 3 months after the operation was statistically significant. The surface density of tubulo-vesicular membranes had decreased to 22,000 cm^2/cm^3. The area of canalicular membrane showed a significant decreased from about 31,000 cm^2/cm^3 to 24,000 cm^2/cm^3. The possibility that qualitative changes within the canalicular membrane 3 months after PGV are important for the observed reduction in acid output, in addition to the reduced amount of canalicular membrane, cannot be excluded. The relative volume of dense bodies was more than doubled 3 months after PGV, and the observed removal of tubulo-vesicular membranes between the 10 days and the 3-month stage may therefore be due to lysosomal activity.

3200 DIAGNOSIS OF DUODENAL ULCER BY ENDOSCOPY. (Ger.) Kratochvil, P.; Brandstatter, G. (Landeskrankenhaus Graz, Auenbruggerplatz 1, A-8020, Graz, Austria). *Wien. Klin. Wochenschr.* 88(24): 804-806; 1976.

3201 USE OF ENDOSCOPY FOR THE DIAGNOSIS OF PEPTIC ULCERS OF THE ANASTOMOSIS AND JEJUNUM. (Rus.) Spivak, V. P.; Samoilova, V. Y. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo* (11):81-83; 1976.

3202 DUODENAL ULCER. II. DRUG TREATMENT. (Fre.) Lambert, R. (Hopital Edouard Herriot, Place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(8):639-642; 1977.

3203 CLINICAL AND EXPERIMENTAL STUDIES ON THE ETIOLOGY OF PEPTIC ULCER. (Jpn.) Imai, K. (Sch. Medicine, Nagoya Univ., Japan). *Jpn. J. Gastroenterol.* 73(2):108-122; 1976.

3204 CARBONIC ANHYDRASE INHIBITORS IN THE TREATMENT OF GASTRIC AND DUODENAL ULCERS. (Fre.) Puscas, I.; Paun, R.; Ursea, N.; Dragomir, N.; Roscin, M. (Hopital Simleul Silvaniei, Salaj, Rumania). *Arch. Fr. Mal. App. Dig.* 65(8):577-583; 1976.

3205 NON-PROTEOLYTIC ENZYMES OF HUMAN GASTRIC AND DUODENAL MUCOSA IN ULCEROUS DISEASE. (Rus.) Ivanov, G. G. (Regional Hosp., Kurgan, USSR). *Vopr. Med. Khim.* 22(3):339-342; 1976.

206 THE ACID CONCENTRATION OF THE PARIETAL COMPONENT OF THE GASTRIC JUICE IN NORMAL
NDIVIDUALS AND IN PATIENTS WITH GASTRODUODENAL
ISEASE. (Fre.) Ligny, G.; Smets, P.; De Graef, J.
Iopital Civil, boulevard Janson, 6000 Charleroi,
elgium). *Biol. Gastroenterol. (Paris)* 9(5):221-
32; 1976.

207 VALUE OF ASSESSING CHLORIDE ION CONCENTRATION IN GASTRIC JUICE TO EVALUATE GASTRIC
ECRETION TESTS IN PATIENTS WITH PEPTIC ULCER.
Pol.) Bucki, J.; Legutko, J.; Litwin, A. (Samod-
ielny Oddzial Chirurgii Gastroenterologicznej AM,
1-202 Krakow, Pradnicka 37, Poland). *Przegl. Lek.*
3(8):731-718; 1976.

208 MORPHOLOGIC CHANGES IN GASTRIC AND DUODENAL MUCOSA IN DUODENUM ULCER AMONG
OUNG SUBJECTS. (Bul.) Manevska, B.; Zlateva, M.;
arinov, M. (Medical Acad., Varna, Bulgaria).
utr. Boles. 15(3):68-73; 1976.

209 EFFECT OF SECRETIN ON GASTRODUODENAL MOTILITY. (Rus.) Geller, L. I.; Petren-
o, V. F. (Khabarovsk Medical Inst., Khabarovsk,
SSR). *Vrach. Delo* (11):78-80; 1976.

210 COMBINED ULCERS OF THE STOMACH AND DUODENUM. (Ger.) Schwamberger, K.; Troyer,
.; Riedler, L. (Chirurgische Klinik der Univer-
itat, Anichstr. 35, A-6020 Innsbruck, Austria).
unch. Med. Wochenschr. 118(40):1269-1270; 1976.

211 CAUSES OF THE MECHANIC AFFERENT LOOP SYNDROME AFTER GASTRIC RESECTION FOR
LCERATIVE DISEASE. (Rus.) Sazonov, S. P. (Tiumen
ledical Inst., Tiumen, USSR). *Vestn. Khir.* 117(12):
7-30; 1976.

3212 CORRELATION BETWEEN SIALIC ACID AND HYDROCHLORIC ACID SECRETION IN THE STOMACH IN PEPTIC ULCER AND IN GASTRITIS. (Pol.) Chojnacki, J.; Adamska-Dyniewska, H.; Klupinska, G.; Atta, W. (91-347 Lodz, ul. Kniaziewicza 1/5, III Klinika Chorob Wewnetrznych Instytutu Medycyny Wewnetrznej WAM, Poland). *Pol. Tyg. Lek.* 32(12):451-453; 1977.

3213 HEMORRHAGES FROM THE UPPER GASTROINTESTINAL TRACT. (Rus.) Reut, A. A.; Afanasiev, S. V.; Basinskikh, V. I.; Buinov, B. B. (Irkutsk Medical Inst., Irkutsk, USSR). *Khirurgiia (Mosk.)* (12):28-32; 1976.

3214 MALROTATION OF THE DUODENUM AND DUODENAL ULCER. (Dan.) Gravgaard, E.; Moller, S H.; Andersen, D. (Egebjergvej 28, DK-8220 Brabrand, Denmark). *Ugeskr. Laeger* 138(51):3271-3273; 1976.

3215 GASTRODUODENAL ULCERS IN CHRONIC NONSPECIFIC PULMONARY DISEASES. (Rus.) Ioseliani, G. D.; Efremov, A. V. (Inst. Experimental and Clinical Surgery, Georgian SSR Ministry Health, Tbilisi, USSR). *Vestn. Khir.* 116(8):11-13; 1976.

3216 CORRELATION BETWEEN PEPTIC ULCER AND THROMBOANGIITIS. (Pol.) Cieslik, R.; Stadnik, J.; Macyszyn, R. (II Klinika Chirurgiczna Instytutu Chirurgii Sl. A. M., 41-900 Bytom, ul. Axentowicza 1/3, Poland). *Przegl. Lek.* 33(8):718-720; 1976.

See also, 2784, 2789, 2793, 2804, 2811, 2813, 2814,
2815, 2816, 2819, 2820, 2824, 2828, 2830,
2832, 2991, 3003, 3007, 3041, 3060, 3086,
3141, 3171, 3173, 3174, 3232, 3268, 3532.

SMALL INTESTINE

217 MASSIVE INTESTINAL INFARCTION IN YOUNG WOMEN: COMPLICATION OF USE OF ORAL CON-
RACEPTIVES? (Eng.) Koh, K. S.; Danzinger, R. G.
Dept. Surgery, Univ. Manitoba, Winnipeg, Manitoba
2H 2A6, Canada). *Can. Med. Assoc. J.* 116(5):513-
15; 1977.

he cases of two women with massive intestinal in-
arction due to occlusion of the celiac, superior
esenteric, and inferior mesenteric arteries are
resented. Both patients, 37 and 29 yr old, were
smokers and had taken oral contraceptives for 5 and
yr, resp. Both patients presented with epigastric
r lower abdominal pain associated with nausea and
omiting. Both patients subsequently developed
signs of peritonitis. In the first patient, laparotomy revealed peritonitis with gangrene of almost the entire small bowel plus the sigmoid colon; all but the duodenum and the distal 10 cm of terminal ileum were resected. She subsequently developed arterial occlusion in the leg necessitating amputation, and a cecal fistula that persisted despite three attempts at closure. The right side of the transverse colon was removed at a second laparotomy, and total parenteral nutrition was begun. The patient died of *Candida albicans* septicemia. Autopsy revealed thrombosis of the celiac, superior mesenteric, inferior mesenteric, and common iliac arteries and premature atherosclerotic changes in the common iliac arteries. Laparotomy in the second patient revealed a gangrenous, perforated ileal loop, requiring resection of 122 cm of ileum. A

second laparotomy disclosed a jejunocolic fistula, complete atrophy of the remaining small intestine and right transverse colon, and perforation of the ischemic cecum. The cecum was oversewn, and a "mucus fistula" was created in the ascending colon; the gastrointestinal contents thus passed from the proximal jejunum to the distal transverse colon. The patient survived and is receiving supplemental parenteral nutrition. Oral contraceptives could not be proven to be a causative factor; although such an association is uncommon, it should be considered in young women with abdominal pain.

3218 ANGIOGRAPHIC DIAGNOSIS OF SMALL INTESTINAL INTUSSUSCEPTION.

(Eng.) Lande, A.; Schechter, L. S.; Bole, P. V. (Jersey City Medical Center, Jersey City, NJ 07304). *Radiology* 122(3): 691-693; 1977.

The angiographic findings in a patient with a small intestinal intussusception are presented. The intussusception occurred postoperatively in a 22-yr-old man following a fall. The patient underwent abdominal angiography to investigate continuous postoperative abdominal distension and significant electrolyte imbalance. This procedure suggested intussusception, and reexamination revealed an antegrade ileoileal intussusception measuring 12-15 cm in length in the proximal ileum. Several adhesions binding the intussusception were lysed, followed by spontaneous reduction of the intussusception. The angiographic configuration of the small intestinal intussusception was compared to a series of opposing angles with a beak-like conglomeration of vasa recta attached to its distal and proximal end.

3219 SIGNIFICANCE OF PNEUMATOSIS CYSTOIDES INTESTINALIS AFTER JEJUNOILEAL BYPASS.

(Eng.) Feinberg, S. B.; Schwartz, M. Z.; Clifford, S.; Buchwald, H.; Varco, R. L. (Univ. Minnesota Hosp., Box 292 Mayo Memorial Bldg., Minneapolis, MN 55455). *Am. J. Surg.* 133(2):149-152; 1977.

The significance of radiographically demonstrable pneumatosis after jejunoileal bypass was evaluated in 148 patients. Pneumatosis intestinalis was demonstrated on postoperative abdominal scout films on 28 occasions in 24 patients with jejunoileal bypass. Pneumatosis intestinalis was confined to the right colon. Abnormal clinical findings were present in 22 of the 28 episodes. The symptoms included nausea (11 patients), vomiting (12), low grade fever (5), abdominal pain (6), and abdominal distention (2). The stool frequency did not increase with pneumatosis. Similar clinical findings of nausea, vomiting, and/or fever were seen in seven of these patients at a time when there was no radiological evidence of pneumatosis. It appears that pneumatosis intestinalis does not represent a specific sign for bypass enteritis.

3220 POSSIBLE CONNECTION BETWEEN INFECTIONS WITH Yersinia enterocolitica AND REGIONAL ENTERITIS. PRELIMINARY CUMMUNICATION.

(Ger.) Antalik, J. (Rontgenabteilung des Bezirkskrankenhauses, Ounz Nove Zamky, Czechoslovakia). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6):510-514; 1976.

Microbiological, pathologicoanatomical, and clinical pictures of infections with *Yersinia enterocolitica* are outlined. Distinct radiological similarity was detected between enteric infection with *Y. enterocolitica* and Crohn's disease in three patients. No pathologicoanatomical substratum of the x-ray findings has yet been discovered. Only investigation of additional cases, long-term supervision, and development of Crohn's disease from infection with *Y. enterocolitica* will prove a possible connection between the two diseases.

3221 CHOLESTEROL METABOLISM IN PATIENTS WITH RESECTION OF ILEUM AND PROXIMAL COLON.

(Eng.) Ho, K. J.; Bondi, J. L. (Univ. Alabama in Birmingham, Medical Center, University Station, Birmingham, AL 35294). *Am. J. Clin. Nutr.* 30(2): 151-159; 1977.

Compartmental analysis of the disappearance curve of serum cholesterol specific activity after the i.v. administration of a tracer dose of cholesterol-4-^{14}C was carried out in five patients with resection of the distal small intestine, cecum, and proximal colon The data fit a two compartment model in all five cases, with the rapidly exchangeable pool of 16.6 ± 3.2 g (60% of the mean of 15 normal controls) and the slowly exchangeable pool of 31.5 ± 10.9 g (65%). The reduction of the pool sizes was associated with a shorter mean transit time of cholesterol (22.15 ± 8.07 days, 40%) and increased turnover rate (2.42 ± 0.72 g/day, 172%). Direct fecal analysis for the neutral sterols and bile acids derived from the exchangeable pool confirmed the turnover rate obtained from the compartmental anaylsis. The increased fecal excretion was mainly in the bile acid fraction. The results suggest that the ileal and proximal colon resection results in bile acid malabsorption, which, in turn, increases hepatic cholesterol and bile acid synthesis. The synthetic rates, however, could not compensate totally for the excretory rate. Therefore the pool size decreased to a new low steady state of equilibrium.

3222 BYPASS ENTEROPATHY: INTESTINAL AND SYSTEMIC MANIFESTATIONS FOLLOWING SMALL-BOWEL BYPASS.

(Eng.) Drenick, E. J.; Ament, M. E.; Finegold, S. M.; Corrodi, P.; Passaro, E. (Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *JAMA* 236(3):269-272; 1976.

Intestinal and systemic manifestations following jejunoileal bypass surgery were studied in 26 patients. Clinical assessment, determination of nitrogen balance, fecal protein loss by chromated ^{51}Cr serum albumin excretion, 24-hr urinary oxalate excretion, histologic study of resected and needle biopsy specimens, quantitative studies of aerobic and anaerobic flora, and mass spectroscopy of enteric gas were carried out. Twenty-three patients had end-to-end procedures, and the other three patients had an end-to-side procedure. Diarrhea with irregular exacerbations occurred in all of the 15 patients who developed enteropathy and in only 1 of the 11 patients without enteropathy. Recurrent fever, arthralgia, skin lesions, and pseudo-obstruction occurred only in patients with enteropathy. Surgical exploration, performed in six patients, revealed greatly dilated small and large bowel loops. Histological examination of the mucosa of the bypassed segment in five patients revealed blunting of the villi, increased number of lymphocytes and plasma cells in the lamina propria, and increased mononuclear cells in transmigration and mitotic figures in the epithelium, which had lost its polarity. The bacterial population in the excluded loops of six patients was highly variable in species and number, ranging from a mixed aerobe-anaerobe flora to pure cultures of *Escherichia coli*. Abnormally high fecal protein excretion (up to 16 g/day) was found in four of five patients with enteropathy and in none of three patients without enteropathy. Of 14 patients with enteropathy in whom baseline and sequential liver biopsies were performed, 12 manifested increasing steatosis, and in 4 of these, fibrosis became noticeable. Of 10 patients without enteropathy in whom biopsies were done, 6 had similar fatty changes; fibrosis developed in 1 heavy drinker, while in 4 patients, the liver remained unaltered. There was no distinct correlation between steatosis and enteropathy. Hyperoxaluria in excess of 40 mg/24 hr was seen in 11 of 23 patients. Of these, only six had evidence of overt enteropathy, suggesting etiologic mechanisms other than the inflammatory process. This study indicates that jejunoileal bypass may produce an enteropathy in the excluded segment of small bowel that can elicit intestinal disorders and manifestations of a systemic illness with complications in distant organs.

3223 ABNORMALITIES OF CIRCULATING 25-OH VITAMIN D AFTER JEJUNAL-ILEAL BYPASS FOR OBESITY: EVIDENCE OF AN ADAPTIVE RESPONSE. (Eng.) Teitelbaum, S. L.; Halverson, J. D.; Bates, M.; Wise, L.; Haddad, J. G. (Jewish Hosp., 216 South Kingshighway, St. Louis, MO 63110). *Ann. Intern. Med.* 86(3):289-293; 1977.

Circulating levels of 25-OH vitamin D were measured in 44 patients who had undergone small intestinal bypass for obesity. Sixty-one percent had hypovitaminosis D. A rapid rate of weight loss was attended by lower concentrations of the vitamin D metabolite. This adaptive response was also reported for circulating total calcium, magnesium, albumin, and alkaline phosphatase. The serum concentration of 25-OH vitamin D, calcium, and magnesium was negatively related to circulating immunoreactive parathyroid hormone, which was high in 6 of 28 patients measured. Impaired intestinal absorption of 25-OH vitamin D was seen in two patients. Seasonal variation had no influence on the relation between serum 25-OH vitamin D and postoperative interval. Despite apparent abnormalities of mineral metabolism in the group studied, there was little evidence of densitometrically evaluated bone disease. The bone densities of 2 of 32 patients were below the 95% confidence limit. Oral administration of a single dose of 25-OH vitamin D_3 in capsular form (5 μg/kg) to these two patients resulted in subnormal elevations of serum 25-OH vitamin D. Skeletal biopsies of three of six patients showed increased numbers of osteoclasts or increased osteoid content. It is concluded that small intestinal bypass results in at least transient deficits of circulating 25-OH vitamin D; prolonged observation is suggested to discover whether this procedure promotes clinically significant skeletal abnormalities.

3224 STUDY OF THE ELECTRICAL POTENTIAL DIFFERENCE BETWEEN ILEAL MUCOSA AND SKIN IN THE CHILD. EFFECT OF A REDUCTION OF SODIUM INTAKE. (Fre.) Ricour, C.; Feydy, P.; Arhan, P. (Hopital des Enfants-Malades, 149 rue de Sevres, 75730 Paris Cedex 15, France). *Ann. Chir. Infant.* 18(1):5-10; 1977.

3225 THE INFLUENCE OF SOMATOSTATIN ON SERUM GASTRIN CONCENTRATIONS IN PATIENTS AFTER TOTAL DUODENOPANCREATECTOMY. (Ger.) Pointner, H.; Flegel, U.; Tragl, K. H.; Hengl, G. (I. Medizinische Universitatsklinik, Lazarettgasse 14, A-1097, Vienna, Austria). *Wien. Klin. Wochenschr.* 89(3):83-85; 1977.

3226 MECHANICAL COMPLICATIONS AND OBSTETRICAL RISKS OF INTESTINAL BY-PASS IN OBESITY. (Fre.) Labayle, D.; Duron, J. J.; Buffet, C.; Chaput, J. C.; Etienne, J. P. (Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, F 92141 Clamart, France). *Arch. Fr. Mal. App. Dig.* 65(6):487-490; 1976.

3227 IMMEDIATE POSTOPERATIVE CONSEQUENCES OF THE JEJUNO-ILEAL BYPASS IN MAN AND IN THE RAT. (Fre.) Saegesser, F.; Macarone-Palmieri, R.; Robinson, J. W. L.; Mirkovitch, M. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Biol. Gastroenterol.* 9:320-321; 1976.

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3233 INTRALUMINAL DIVERTICULUM OF THE DUODENUM AND COMMON MESENTERY ASSOCIATED WITH A MOTOR-SENSORY NEUROPATHY. (Fre.) Debray, C.; Couturier, D.; Moreaux, J.; Truelle, J. L.; Leymarios, J. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris, Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 65(6):473-479; 1976.

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3242 A RARE CASE OF ILEAL INFLAMMATORY FIBROID POLYP (ONE OF EOSINOPHILIC GRANULOMA). (Jpn.) Nakamura, S.; Ogata, Y.; Akisato, K.; Kobayashi, T.; Hayashi, I.; Umezono, A.; *et al.* (Saiseikai Utsunomiya Hosp., Japan). *Jpn. J. Cancer Clin.* 21(8):642-645; 1975.

3243 TWO CASES OF DUODENAL VILLUS TUMOR IN PATIENTS WITH LARGE INTESTINAL DIFFUSE POLYPOSIS. (Rus.) Mushnikova, V. N.; Nikitin, A. M.; Protasevich, A. A. (Scientific Res. Lab. Proctology with Clinic, Ministry Public Health USSR, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (6):84-86; 1976.

3244 ABSORPTION CAPACITY OF THE SMALL INTESTINE MUCOSA IN PATIENTS WITH FOOD TOXICOINFECTION. (Rus.) Dubova, A. V.; Bublyi, V. P.; Kolyakova, T. A.; Jatsukov, A. A. (Clinical Dept., Astrakhan' Branch, Central Scientific Res. Inst. Epidemiology, Astrakhan', USSR). *Klin. Med. (Mosk.)* 54(11):55-58; 1976.

3245 SEPTICEMIA CAUSED BY *Yersinia enterocolitica*. (Ger.) Baier, R.; Puppel, H.; Hein, J. (Hygiene-Institut der Universitat, 3550 Marburg, Pilgrimstein 2, W. Germany). *Dtsch. Med. Wochenschr.* 102(2):54-48; 1977.

3246 *Yersinia enterocolitica* INFECTIONS IN THE ZURICH AREA: BACTERIOLOGIC-SEROLOGIC DIAGNOSIS AND CLINICAL PICTURE. (Ger.) Mosimann, J.; Busser, L.; Stierlin, W.; Wiesmann, E. (Institut fur Medizinische Mikrobiologie der Universitat, Gloriastrasse 32, CH-8028, Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(2):38-42; 1977.

3247 Yersinia enterocolitica INFECTION IN PATIENTS WITH ACUTE ABDOMINAL SYMPTOMS. A PROSPECTIVE INVESTIGATION. (Dan.) Andersen, L.; Christiansen, P. M.; Lauritsen, K. B.; Korner, B.; Jepsen, O. B.; Henrichsen, S.; *et al.* (Bispebjerg Hosp., DK-2400 Kobenhavn NV, Denmark). *Ugeskr. Laeger* 139(2):71-75; 1977.

See also, 2819, 2965, 2981, 2988, 3020, 3026, 3039, 3041, 3054, 3055, 3056, 3057, 3062, 3065, 3066, 3083, 3153, 3158, 3163, 3165, 3166, 3180, 3203, 3214, 3249, 3253, 3255, 3256, 3257, 3263, 3272, 3303, 3304, 3306, 3333, 3546, 3548, 3549, 3551, 3559, 3565, 3569, 3572, 3575, 3577.

SMALL INTESTINE

Malabsorption

3248 PLASMA TRIGLYCERIDE INCREASE AFTER ORAL FAT LOAD IN MALABSORPTION DURING EARLY CHILDHOOD. (Eng.) Fallstrom, S. P.; Nygren, C. O.; Olegard, R. (Dept. Pediatrics I, Ostra Sjukhuset, 41685 Goteborg, Sweden). *Acta Paediatr. Scand.* 56(1):111-116; 1977.

The effect of oral fat load on the triglyceride concentration in plasma was studied to evaluate the use of this test in the diagnosis of fat malabsorption during early childhood (1 month to 3 years of age). Thirty-two children with various fat malabsorption syndromes, 8 children with transient growth retardation, and 29 controls were tested for plasma triglycerides before, and after (at 2 and 4 hr) a test meal of 2 g of neutral fat per kg. Two hours after the test meal, control children over 4 months of age showed the largest increase in plasma triglycerides, with a mean of 1.34 mM; it was always greater than 0.50 mM, or 60% of the fasting level. Some of the control children younger than 4 months showed slightly smaller increases, but they were always greater than 0.30 mM, or 40% of the fasting levels. Children suffering from defective digestion had no significant increases at 2 hr, usually less than 0.20 mM, or 23% of fasting levels. Children with gluten enteropathy had significantly higher fasting levels than controls ($p<0.01$), but there were no obvious increases until after 4 hr, and they were always less than 0.75 mM. Children with transient growth retardation showed increases similar to those observed in the controls. Using the above criteria, 30/32 (94%) of the children with fat malabsorption syndromes showed abnormal plasma triglyceride increases of less than 0.30 mM and 0.50 mM before and after 4 months of age, resp. Finally, a greater percentage of the patients with malabsorption produced abnormal results with the triglyceride test than with two other common tests, xylose (76%) and fecal fat (55%).

3249 DUODENAL BILE ACID CONCENTRATIONS IN FAT MALABSORPTION SYNDROMES. (Eng.) Westergaard, H. (Rigshospitalet, Blegdamsvej 9, DK 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(1):115-122; 1977.

The relationship of meal-stimulated bile acid concentrations in the duodenum to fat absorption was observed in 38 healthy persons and in 138 patients with various gastrointestinal diseases, sometimes associated with fat malabsorption characterized by steatorrhea. In controls, the mean duodenal bile acid concentration was 10.8 mM/1. Below normal bile acid concentrations consistently resulted in steatorrhea in most patients with gastric disease, except in those with duodenal ulcers. Low bile acid concentrations accompanied by steatorrhea were frequently observed in patients with gastric surgery, cholestasis, the stagnant loop syndrome, or ileal disorders. Bile acid concentrations appeared deceptively low in duodenal ulcer patients and in patients with cholecystectomy, due to increased secretory volumes. Normal bile acid concentrations were observed in patients with pancreatic disease, since fat malabsorption is due to inefficient lipolysis. In patients with the stagnant loop syndrome, unconjugated bile acids were demonstrated, indicating abnormal intestinal flora. These results suggest that measurement of total and individual bile acid concentrations stimulated by test meals can be useful in the diagnosis of certain fat malabsorption syndromes.

3250 IDIOPATHIC BILE ACID CATHARSIS. (Eng.) Thaysen, E. H.; Pedersen, L. (Aalborg Sygehus, POB 561, DK 9100 Aalborg, Denmark). *Gut* 17(12):965-970; 1976.

The case reports of three patients in whom idiopathic bile acid malabsorption was responsible for chronic diarrhea are presented. The patients included a 57-yr-old woman with a 35-yr history of diarrhea, a 35-yr-old man with a 15-yr history, and a 49-yr-old woman who had diarrhea all of her life. The diarrhea in the three patients was not associated with ileopathy nor with any other disorder allied to diarrhea. Screening for bile acid malabsorption was performed by means of the ^{14}C-cholylglycine breath test, and kinetics and pool size of chenodeoxycholic acid were assessed by the isotope dilution technique. In the first two patients, the breath test indicated bile acid malabsorption, whereas the third patient had a marked pathological breath $^{14}CO_2$, but a normal 24 hr ^{14}C fecal radioactivity. Six months later, fecal radioactivity in this patient was also found to be abnormal. The chenodeoxycholic acid (CDC) half-life in the three patients was 0.8, 1.1, and 0.8 days, resp. (control 3.0 days), and the CDC synthesis rates were 1.7, 1.6, and 6.8 mmol/24 hr, resp. (control 0.4 mmol/24 hr). The diarrhea resolved immediately in all three patients when they were treated with cholestyramine (2-3 g questrane t.i.d.). The symptoms returned in all patients whenever treatment was withdrawn. Idiopathic catharsis should be suspected in patients with unexplained chronic diarrhea, and especially in those with a diagnosis of irritable colon with diarrhea.

3251 THE 15 g D-XYLOSE ABSORPTION TEST: ITS APPLICATION TO THE STUDY OF COELIAC DISEASE.

(Eng.) Stevens, F. M.; Watt, D. W.; Bourke, M. A.; McNicholl, B.; Fottrell, P. F.; McCarthy, C. F. (Regional Hosp., Galway, Ireland). *J. Clin. Pathol.* 30(1):76-80; 1977.

The potential of the D-xylose absorption test as a screening method for occult adult celiac disease was investigated in 17 untreated adult celiac disease patients, 21 treated celiac patients, and 30 nonceliac disease patients. Each patient received a p.o. load of 15 g of D-xylose, and serial blood levels were determined. A statistically significant difference in xylose blood levels was found between untreated celiac and nonceliac patients at all times after D-xylose administration, but a complete separation between these two groups occurred only after 75 min. The reproducibility of absorption was assessed by repeating the test in 16 subjects (4 untreated patients, 3 treated patients, and 9 controls). The 95% confidence limits were narrowest at 75 and 90 min. The D-xylose test will probably be useless in screening asymptomatic relatives of patients with celiac disease, but it may be used to demonstrate changes in intestinal absorptive function in a single individual.

3252 DNA SYNTHESIS BY JEJUNAL MUCOSA IN RESPONSIVE AND NON-RESPONSIVE COELIAC DISEASE.

(Eng.) Jones, P. E.; Peters, T. J. (Royal Postgraduate Medical Sch., London W12 OHS, England). *Br. Med. J.* 1(6069):1130-1131; 1977.

DNA synthesis by jejunal biopsy specimens from 22 patients with adult celiac disease and from 13 controls was measured by an organ culture technique to determine the enterocyte production rate in celiac disease patients. The DNA synthesis rate in the mucosa of the 6 patients with untreated celiac disease was almost eight times that in specimens from the 13 control patients with normal mucosa (mean, 92 ± 16 counts/min/μg DNA versus 13 ± 0.7 cpm/μg DNA, $p<0.01$). The seven patients whose jejunal mucosa remained flat despite gluten withdrawal showed a rate of DNA synthesis (34 ± 1.1 cpm/μg DNA) significantly lower than that of the untreated celiac group ($p<0.05$). The nine patients with celiac disease in whom gluten withdrawal had improved the jejunal morphology had a DNA synthesis rate similar to that of the controls. Impaired enterocyte production in nonresponsive celiac disease may be responsible for the failure to regenerate villi after gluten withdrawal.

3253 PATCHINESS AND DUODENAL-JEJUNAL VARIATION OF THE MUCOSAL ABNORMALITY IN COELIAC DISEASE AND DERMATITIS HERPETIFORMIS.

(Eng.) Scott, B. B.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 17(12):984-992; 1976.

Studies were designed to document the incidence and degree of patchiness of mucosal abnormality in celiac disease (CD) and dermatitis herpetiformis (DH), to compare duodenal with jejunal biopsies in control subjects, and to assess variation between these two sites in patients with CD and DH. As judged by both stereomicroscopy and subjective histology, patchiness occurred frequently in both CD and DH patients. In most cases, the difference of abnormality was of only one grade, but in approximately 25% as assessed by stereomicroscopy and 10% as assessed by histology, the difference was of two or more grades. In 19 control subjects with normal small bowel mucosa, the variation of the mucosal appearance between the duodenum and proximal jejunum was studied. No significant difference of villous and crypt measurements or of apparent villous "bridging" and "branching" between these two sites was found, if only well-oriented sections were studied. The stereomicroscopic appearances were also similar at these two sites, although villi tended to be broader in the duodenal biopsies. The duodenal-jejunal variation was also studied in CD and DH patients and, although by both stereomicroscopy and subjective histology the appearances were similar in most patients, in approximately 33%, the duodenal abnormality was the more severe; the jejunal abnormality was more severe in approximately 15%. It is concluded that multiple, precisely located biopsies of both the duodenum and proximal jejunum are invaluable in the investigation of small bowel disease and in assessing response to treatment.

3254 DIGESTIVE INTOLERANCE TO COW'S MILK PROTEIN. RECENT IMMUNOLOGICAL DATA.

(Fre.) Scheinmann, P.; Paupe, J. (CHU Necker-Enfants-Malades, 156 rue de Vaugiraud, 75780 Paris Cedex 15, France). *Rev. Fr. Allergol.* 16(3):157-161; 1976.

Recent immunological data on digestive intolerance to cow's milk (DM) is reviewed. This phenomenon is transient, starting during the first 3 months of life and, as a rule, disappearing after 2 yr. Total antimilk antibodies (AAM) and anti-β-lactoglobulin, α-lactalbumin, casein, serum albumin, and bovine α-globulins may be detected by passive hemagglutination and precipitation. Clinically, β-lactoglobulin is the most allergenic fraction, and AAM belongs to IgG and IgA in particular. Elevated AAM has also been detected in cases of nonspecific diarrhea and celiac disease. Further, antimilk IgE levels are also detectable in patients with DM, and a relation between the clinical symptomatology and allergy to cow's milk is not clear. Immunity to cellular mediation has also been implicated in DM. A positive lymphoblastic transformation test has been reported in DM, but it cannot exclude or confirm the presence of DM. Others have reported elevated IgA serum levels and IgA and IgM fecal levels in DM. Jejunal biopsy at the time of appearance of DM has revealed increased numbers of cells with IgA and IgM. Plasmacytes with IgE have also been reported in the lamina propria. In retrospect, DM is attributed to a disturbance of local or general immune reactions.

3255 REINVESTIGATION OF LACTOSE INTOLERANT CHILDREN: LACK OF CORRELATION BETWEEN CONTINUING LACTOSE INTOLERANCE AND SMALL INTESTINAL MORPHOLOGY, DISACCHARIDASE ACTIVITY, AND LACTOSE TOLERANCE TESTS. (Eng.) Harrison, M.; Walker-Smith, J. A. (Medical Coll. St. Bartholomew's Hosp., London, England). *Gut* 18(1):48-52; 1977.

Thirty children (aged 2-38 months) on a lactose-free diet who had previously been diagnosed as having secondary lactose intolerance were reinvestigated on 32 occasions by a p.o. lactose tolerance test, small intestinal biopsy, and measurement of disaccharidase activity to detect the presence of continuing lactose intolerance before reintroduction of milk. Four children developed profuse diarrhea, with 0.5-2% reducing substances in the stools and the pattern of lactose malabsorption on stool chromatography after a lactose tolerance test (LTT); a clinical diagnosis of continuing lactose intolerance was made in these children. There was no correlation between this clinical diagnosis, the maximum rise in blood glucose during the LTT, the morphology of the small intestinal mucosa, or the level of lactase activity. Clinical lactose intolerance occurred whether the rise in blood glucose was flat, border-line, or normal. Lactase activities were normal in all patients showing clinical lactose intolerance, and most children with a flat rise had normal lactase levels on biopsy. It is concluded that there is a negative correlation on the one hand between the maximum rise in blood glucose during LTT, the small intestinal morphology, and lactase activity, and on the other hand with continuing lactose intolerance.

3256 POLYMYOSITIS AS A CAUSE OF MALABSORPTION. A CASE REPORT. (Eng.) Transfeldt, E. E.; Morley, J. E.; Segal, F.; Klein, A.; Bill, P.; Fancourt, M. (Baragwanath Hosp., Johannesburg, South Africa). *S. Afr. Med. J.* 51(6):176-178; 1977.

The case report of a 52-yr-old woman with malabsorption associated with polymyositis is presented. The patient presented with fatigue, weight loss, weakness, dysphagia for solids, and chronic constipation. She showed evidence of malabsorption, with low serum levels of albumin, carotene, vitamin A, and iron. D-xylose absorption was indicative of malabsorption, and the glucose tolerance curve was flat. There was evidence of bacterial overgrowth in the duodenal aspirate, and *Giardia lamblia* was found in the stools. The esophagus was dilated and aperistaltic. The duodenum and jejunum were dilated, and small bowel transit time was prolonged. The muscle enzyme levels were elevated, and esophageal manometry and electromyography revealed features consistent with polymyositis. A duodenal biopsy specimen revealed a mild inflammatory cell infiltrate of the lamina propria and a decrease in elastic tissue. The patient responded to treatment with steroids, antibiotics, and metronidazole. The mechanism of malabsorption in polymyositis probably involves bacterial overgrowth in the small intestine, owing to impaired intestinal motility.

3257 JEJUNAL MUCOSA IN INFANTILE PROTEIN-CALORIE DEFICIENCY. (Eng.) Loeb, H.; Van Steirteghem, A.; Bossuyt, M.; Rodesch, P. (Kindergeneeskunde, Sint-Pieterziekenhuis, Hoogstraat 320, B-1000 Brussels, Belgium). *Acta Paediatr. Belg.* 29(1):19-23; 1976.

The jejunal mucosae were examined in 11 children, 1 to 12 yr of age, who had protein-calorie deficiencies with hypoproteinemia to determine whether the degree of villous atrophy has any relationship to the severity of the condition or length of treatment. Five of the children presented with kwashiorkor, six with marasmic kwashiorkor, and all but two of the children had had 2 to 17 weeks of refeeding. All the children had diarrhea during refeeding. Direct examination of the jejunal mucosae taken by intestinal biopsy showed mainly leaves and ridges, without any evidence of complete villous atrophy, characterized by a mosaic pattern. Histological examination revealed either normal mucosae or only minor atrophy in all but one child, who had generalized edema and subtotal atrophy and who had not yet received any treatment. However, the other child who had not received treatment had normal mucosae, while some children who had had 2 months of refeeding still showed minor atrophy. No apparent correlation could be drawn between the degree of villous atrophy, but the severity of hypoproteinemia, the duration of treatment, and the presence of diarrhea.

3258 WHIPPLE'S DISEASE WITH MINIMAL INTESTINAL INVOLVEMENT. (Eng.) Moorthy, S.; Nolley, G.; Hermos, J. A. (Boston Veterans Admin. Hosp., Boston, MA). *Gut* 18(2):152-155; 1977.

An uncharacteristic case of Whipple's disease occurring in a 46-yr-old man is presented. The patient presented with a 2-yr history of dementia. Supranuclear ophthalmoplegia, focal myoclonic seizures, fever, lymphadenopathy, panhypopituitarism, and arthritis of both knees were present. Biopsies of both the synovial membrane of the knee, and an axillary lymph node revealed clusters of PAS-positive macrophages. The patient appeared to be undernourished, but had neither diarrhea nor abdominal pain. Barium contrast examinations of the upper and lower gastrointestinal tract were normal, and there was no excess stool fat. The ultrastructural findings in two of four p.o. intestinal biopsies taken at the ligament of Treitz were normal. In the other two specimens, the mucosal architectures were normal in most sections. In one biopsy, however, a focus of macrophages containing PAS-positive material occurred in the lamina propria, and in the other biopsy, scattered PAS-positive macrophages were found at the base of the crypts. With antibiotic therapy, the patient became afebrile, and his arthritis and general physical condition showed objective improvement. His mental status improved moderately, but there were no significant changes in ophthalmoplegia and panhypopituitarism. Because the intestinal lesions of Whipple's disease may be minimal or patchy, rather than diffuse, multiple biopsies should be obtained.

3259 DIET THERAPY FOR INTESTINAL MALABSORPTION. (Ita.) Durand, P.; Della Cella, G. (Istituto "G. Gaslini," III Divisione Pediatrica, Genova-Quarto, Italy). *Clin. Pediatr. (Bologna)* 58(5):187-196; 1976.

3260 NUTRITIONAL DEFECTS IN PATIENTS WITH MALABSORPTION. (Eng.) McCarthy, C. F. (Regional Hosp., Galway, Ireland). *Proc. Nutr. Soc.* 35(1):37-40; 1976.

3261 INTESTINAL ENZYMOPATHIES OF CHILDREN. (Ger.) Schreier, K. (Kinderklinik d. Stadt Nurnberg, Postfach, D-8500 Nurnberg 5, W. Germany). *Munch. Med. Wochenschr.* 118(52/53):1695-1702; 1976.

3262 CHOLERRHEIC MALABSORPTION SYNDROME. (Pol.) Gierblinski, I.; Krygier, T. (Klinika Gastroenterologii, Przemiany Materii CMKP, ul. Goszczynskiego 1, 02-616 Warszawa, Poland). *Pol. Tyg. Lek.* 31(32):1401-1403; 1976.

3263 OBSERVATIONS ON 28 CASES OF MALABSORPTION SYNDROME WITH VILLOPATHY. (Ita.) De La Pierre, M.; Sategna Guidetti, C.; Pera, A. (Istituto di Clinica e Terapia Medica dell'Universita, Scuola di Specialita Malattie dell'Apparato Digerente, Torino, Italy). *Minerva Med.* 67(43):2787-2800; 1976.

3264 ABDOMINAL ANGINA. INTESTINAL ABSORPTION EIGHT YEARS AFTER SUCCESSFUL MESENTERIC REVASCULARIZATION. (Eng.) Tilson, M. D.; Stansel, H. C. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Surg.* 131(3):366-368; 1976.

3265 OBSERVATION OF CELIAC DISEASE IN AN ADULT. (Fre.) Puchelle, J. C.; Lederlin, P.; Rauber, G.; Thibaut, G.; Witz, F.; Aymard, J. P. (C.H.U. de Nancy-Brabois, 54500 Vandoeuvre, France). *Rev. Fr. Gastroenterol.* (124):39-45; 1976.

3266 ADULT COELIAC DISEASE. A CASE WITH ULCERATION, DERMATITIS HERPETIFORMIS AND RETICULOSARCOMA. (Eng.) Tonder, M.; Sorlie, D.; Kearney, M. S. (Dept. Medicine, Surgery, and Morphology, Univ. Tromso, Tromso, Norway). *Scand. J. Gastroenterol.* 11(1):107-111; 1976.

3267 HLA ANTIGENS IN DERMATITIS HERPETIFORMIS AND COELIAC DISEASE. (Eng.) Solheim, B. G.; Ek, J.; Thune, P. O.; Baklien, K.; Bratlie, A.; Rankin, B.; Thoresen, A. B.; Thorsby, E. (Natl. Hosp. Norway, Oslo 1, Norway). *Tissue Antigens* 7(1):57-59; 1976.

3268 FOLATE DEFICIENCY AFTER DIGESTIVE SURGERY. A STUDY BASED ON 50 CASES. (Fre.) Audebert, M.; Gendre, J. P.; Zittoun, J.; Le Quintrec, Y. (Hopital Rothschild, 33, boulevard de Picpus, F-75571 Paris Cedex 12, France). *Arch. Fr. Mal. App. Dig.* 65(6):455-462; 1976.

3269 MANAGEMENT OF SUGAR INTOLERANCE IN CHILDREN. (Eng.) Barnes, G. L. (Royal Children's Hosp., Melbourne, Victoria, 3052, Australia). *N.Z. Med. J.* 83(559):149-151; 1976.

3270 VITAMIN B_{12} MALABSORPTION ASSOCIATED WITH A NORMAL SCHILLING TEST RESULT. (Eng.) Streeter, A. M.; Shum, H. Y.; Duncombe, V. M.; Hewson, J. W.; Thorpe, M. E. C. (Repatriation General Hosp., Concord, N.S.W. 2139, Sydney, Australia). *Med. J. Aust.* 1:54-55; 1976.

3271 JOINT MANIFESTATIONS OF WHIPPLE'S DISEASE. (Ita.) d'Eshougues, J. R.; Delcambre, B.; Defrance, D. (Hopital de la Charite, F-59033 Lille Cedex, France). *Rev. Rhum.* 43(10):565-573; 1976.

See also, 2724, 2981, 2989, 3075, 3153, 3223, 3244, 3406, 3479, 3526.

LARGE INTESTINE

3272 CLINICAL FEATURE, TREATMENT AND PROGNOSIS OF CARCINOID TUMORS: PRELIMINARY OBSERVATIONS IN 14 PATIENTS. (Ger.) Brunner, H.; Kreig, H.; Bruning, K. W. (Chirurgische Klinik der Universitat, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Med. Klin.* 72(8):295-299; 1977.

The clinical features, treatment, and prognosis of carcinoid tumors (CT) in 14 patients are presented. The tumor was localized in the appendix (7 patients), small intestine (3), duodenum (1), rectum (1), and lungs (2). Surgery revealed no true carcinoid syndrome in any of the patients, although widespread metastases were seen in two patients. The patients were followed up 6 months to 14 yr after surgery. Appendicitis was suspected in seven patients; one of whom underwent laparotomy because of an adhesion ileus. Histological examination revealed a noninvasive growing carcinoid and one carcinoid with tumor formation of the muscle layers. The CT had affected the appendix tip in six patients and the base in one patient. All patients remained tumor-free at follow-up. The three patients with CT of the small intestines presented uncharacteristic gastrointestinal symptoms; one had intestinal bleeding. At surgery, a stenosing neoplasm of the ileum with diffuse metastases of the liver and a smooth tumor of the cecum were seen in this patient. The other two patients underwent resection. However, two of the three died postoperatively of cardiorespiratory complications, and the third died suddenly of unknown reasons 8 weeks after operation. The rectal CT was seen in a 33-yr-old woman who had had bloody stools for 3 months. She had no recurrence after surgery. The patient with duodenal CT had adenocarcinoma, and she underwent a resection of the duodenum and pancreas head. A 45-yr-old patient with carcinoid CT and invasive growth was tumor-free 5 yr after lobectomy (LC). LC was also performed in a 16-yr-old girl with bronchial adenoma. The patient was without recurrence at 1-yr follow-up.

3273 HEXOSAMINE-CONTAINING MACROMOLECULES IN HUMAN COLON CARCINOMAS. (Eng.) Terho, T.; Laitio, M. (Dept. Physiology, Univ. Turku, Turku, Finland). *Scand. J. Gastroenterol.* 12(1):7-15; 1977.

Hexosamine-containing macromolecules from normal, transitional, and carcinomatous areas of five resected colons were isolated and characterized. The total concentration of these macromolecules was twice as high in carcinoma areas as in normal areas. While normal mucosa contained mainly sulphated mucin, transitional mucosa and carcinoma cells contained more nonsulphated acid mucin. Acid glycosaminoglycans increased from normal to transitional to carcinoma areas. The concentrations of high molecular weight glycopeptides did not vary in the different areas, but these glycopeptides were more highly sulphated in normal mucosa. Low molecular weight glycopeptides, which made up about half of all hexosamine-containing molecules, were four times as abundant in carcinoma areas and twice as abundant in transitional areas as in normal mucosa. It is suggested that the acid glycosaminoglycans may form a protective barrier around the tumor and, thus, prevent an immunological reaction against it.

3274 CHAGAS' DISEASE OF THE COLON. (Eng.) Da Silveira, G. M. (Federal Univ. Bahia, Bahia, Brazil). *Br. J. Surg.* 63(10):831-835; 1976.

The pre- and postoperative radiographic features, the surgical treatment, the incidence of complications, and the late results in 100 operated cases of chagasic megacolon are reported. The patients ranged in age from 22-76 yr. All patients underwent abdominoperineal rectosigmoidoscopy. The incidence of complications was higher in the 31 patients who underwent direct anastomosis than in those who underwent delayed anastomosis. Among the patients undergoing direct anastomosis, the complications included infection of the presacral space (19.3%), partial breakdown of anastomosis (12.9%), total breakdown of anastomosis (6.4%), stercoraceous fistula (6.4%), vesicorectal fistula (3.2%), peritonitis (3.2%), stenosis of anastomosis (12.9%), and hemorrhage (3.2%). Among those that underwent delayed anastomosis, the corresponding values were 8.6%, 8.6%, 0%, 2.8%, 0%, 0%, 4.3%, and 0%; other complications among these patients included necrosis with retraction of pull-through (4.3%) and nonstenotic narrowing (14.4%). The mortality rate among the patients who underwent the direct procedure was 9.6%, while that in the delayed anastomosis patients was 1.4%. All of the 12 patients who were followed up had normal bowel function. Abdominoperineal rectosigmoidectomy with delayed anastomosis is the recommended surgical treatment for chagasic megacolon.

3275 PERSISTENCE OF PROCTITIS IN 2 CASES OF CLINDAMYCIN-ASSOCIATED COLITIS. (Eng.) Goodacre, R. L.; Hamilton, J. D.; Mullens, J. E.; Qizilbash, A. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 72(1):149-152; 1977.

Two cases of persisting proctitis after an episode of clindamycin-associated colitis are presented. The first patient, a 33-yr-old woman, received an 8-day course of clindamycin (150 mg, 3 x) followed by another 8-day course 6 months later. The second patient, a 64-yr-old woman, received clindamycin (150 mg, 4 x) daily for 22 days prior to hospitalization for symptoms of colitis. Both patients presented with diarrhea associated with mucus and blood. Sigmoidoscopy and rectal biopsy did not reveal a typical pseudomembrane in either patient. Both patients received short courses of Lomotil. The diagnosis of pseudomembranous colitis was not made in either patient until subtotal colectomy was carried out. In both patients, the resected specimen showed persistent mucosal inflammation and fibrosis of the submucosa and muscular layer. The arteries were also narrowed, but no complete occlusion of the vessels was present. Severe proctitis persisted in the rectal stumps of both patients until their removal. The severity of the colitis may have been attributable to the repetition of the course of clindamycin in the first patient and to its prolongation in the second. Lomotil may have contributed to the deterioration seen in both patients, leading to colectomy.

3276 PSEUDOMEMBRANOUS COLITIS. (Eng.) Price, A. B.; Davies, D. R. (Dept. Histopathology, Northwick Park Hosp. and CRC, Harrow, Middlesex, England). *J. Clin. Pathol.* 30(1):1-12; 1977.

A study of 29 patients with pseudomembranous colitis defined the histopathological criteria, based on rectal biopsy material, necessary for diagnosis of three basic stages of the disease. Characteristics that facilitate the differential diagnosis of pseudomembranous colitis from nondiagnostic proctitis in the milder stages to acute ischemic colitis are discussed. Pseudomembranous colitis is characterized by the presence of yellow plaques, 0.2 to 2.0 cm in diameter, which result from localized necrosis of the mucosa in the colon. As the disease progresses, deeper layers of the mucosae are affected, and all normal mucosae between the plaques disappear. The polymorph is the main inflammatory cell type and is associated with nuclear debris. The appearance of the colitis was associated with pre-existing disease in 28 patients and with recent antibiotic therapy in 27 of the 29 patients. A record of previous disease and medications may be useful in diagnosing pseudomembranous colitis. This association of pseudomembranous colitis with previous disease and antibiotic therapy may induce local mucosal damage, which may trigger the Schwartzman reaction. Capillary microthrombosis may then lead to the mucosal necrosis seen later in the disease.

3277 TUBERCULOUS COLITIS. (Eng.) Balikian, J. P.; Uthman, S. M.; Kabakian, H. A. (American Univ. Medical Center, Beirut, Lebanon). *Am. J. Proctol.* 28(1):75-79; 1977.

The case of a 45-yr-old woman with extensive tuberculous colitis is presented, and the differential diagnosis is discussed. The patient had a history of abdominal pain (18 yr), secondary sterility, increasing anorexia, weight loss, and intestinal obstruction. She had mild hepatosplenomegaly and bloody diarrhea. Unusual features included the absence of clinical and radiological evidence of pulmonary tuberculosis and extensive right-sided colitis with little involvement of the terminal ileum. Roentgenograms showed diffuse ulceration and loss of haustrations, thickening and shortening of the bowel, and stricture formation. Skip lesions involved the right colon, the sigmoid colon, and several small bowel segments. The patient responded to anti-tuberculous therapy.

3278 TRANSCATHETER EMBOLIZATION FOR TREATMENT OF DIVERTICULAR HEMORRHAGE. (Eng.) Goldberger, L. E.; Bookstein, J. J. (Univ. California Medical Center at San Diego, 225 W. Dickinson St., San Diego, CA 92103). *Radiology* 122(3):613-617; 1977.

The cases of two patients with massive diverticular bleeding that responded favorably to selective transcatheter embolization are presented, and the technique is described. After initial catheterization and angiography of the superior mesenteric artery, a J-shaped guidewire is advanced as far as possible, usually into a distal ileal or ileo-colic artery. A thin-walled catheter shaped to correspond to the forward bend from the aorta into the superior mesenteric artery, with a 45-degree curve at the distal 1 cm, is advanced over a guidewire to a very distal branch, after which the wire is withdrawn. The catheter is then slowly retracted, progressively engaging each branch along the aspect toward which it is pointed. When the desired branch is encountered, a slight forward thrust enables the placement of the catheter. This technique stopped the bleeding in a 52-yr-old man with diverticular bleeding from a distal branch of the right colic artery. In the second patient, a 69-yr-old man, selective mesenteric angiography revealed bleeding from the right colic artery, which ceased after embolization with oxidized cellulose. Ten months later, the same procedure revealed bleeding from the left side of the transverse colon; partial colectomy with right-sided colostomy and left-sided mucous fistula was performed. The bleeding in both patients had failed to respond to vasopressin infusion. Transcatheter embolization is proposed as an alternative to surgical intervention.

3279 TREATMENT OF SYMPTOMATIC DIVERTICULAR DISEASE WITH A HIGH-FIBRE DIET. (Eng.) Brodribb, A. J. M. (Radcliffe Infirmary, Oxford OX2 6HE, England). *Lancet* 1(8013):664-666; 1977.

The therapeutic value of increasing the daily dietary fiber intake was assessed over 3 months in a double-blind controlled trial of 18 patients with diverticula disease. The patients took either bran or wheat (control) crispbread, amounting to 6.7 g and 0.6 g of dietary fiber, resp., daily. The patients completed a detailed symptomatic questionnaire on dyspeptic symptoms, pain, and symptoms of bowel dysfunction before and after treatment, and the symptoms were scored 0-6 for frequency and severity. There was a highly significant difference in the reduction of total symptom score (high fiber, from 34.3 to 8.1; control from 42.0 to 35.1; p<0.002). The difference in the reduction of pain score was significant (high fiber, from 11.1 to 1.1; control from 12.7 to 10.2; p<0.02), although dyspeptic and bowel dysfunction score differences did not reach statistically significant levels. Two of the nine control patients required further treatment, whil none of the patients on the high fiber diet did. The results demonstrate the therapeutic value of increasin fiber intake in patients with diverticular disease.

3280 EMERGENCE OF DIVERTICULAR DISEASE IN THE URBAN SOUTH AFRICAN BLACK. (Eng.) Segal, I.; Solomon, A.; Hunt, J. A. (Baragwanath Hosp., P.O. Bertsham, 2013, Johannesburg, South Africa). *Gastroenterology* 72(2):215-219; 1977.

The first 16 African black patients seen at Baragwanath Hospital with diverticular disease provided an opportunity to study the effects of urbanization on disease patterns. The mean age of the patients was 48.9 yr, and all had lived in an urban environment for over 20 yr. Most patients had been eating a refined food-low fiber diet since childhood. Half of the patients did not eat maize meal (the staple food of rural blacks), and the other half ate only refined white maize meal. Six patients presented with rectal bleeding, and four presented with hemorrhoids; all 16 patients had a history of constipation. Because of the previous rarity of diverticular disease in black Africans, it was not suspected at presentation. Barium enema studies revealed 6 patients with isolated diverticula (i.e., no more than three per region), and the remaining 10 had diffuse diverticula, the type usually seen in Western countries. Half of the patients had diverticula of over 5 mm. The patients' dietary history confirms the hypothesis that a low fiber diet contributes to diverticular disease, and also shows that the urbanization of the South African black has been accompanied by the emergence of diverticular disease, a condition hitherto virtually nonexistent in this population.

3281 EVIDENCE THAT ABNORMAL MYOELECTRICAL ACTIVITY PRODUCES COLONIC MOTOR DYSFUNCTION IN THE IRRITABLE BOWEL SYNDROME. (Eng.) Snape, W. J., Jr.; Carlson, G. M.; Matarazzo, S. A.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 72(3):383-387; 1977.

The relationship of altered slow-wave activity and the abnormal motility of the distal colon seen in patients with the irritable bowel syndrome was studied in 20 patients and 12 controls. Myoelectrical activity was recorded using a bipolar electrode clipped to the distal colonic mucosa, and motor activity was measured by perfused catheters. Colonic slow waves and contractions were present at two frequencies, 6 and 3 cycles/min. The slow wave frequency seemed to determine the frequency of colonic motor activity. Patients with the irritable bowel syndrome had increased 3-cycle/min slow wave activity in the basal state (comprising 39.6 ± 4.2% of total slow-wave activity versus 9.9 ± 2.2% in controls ($p<0.001$). However, no difference in basal 3-cycle/min motor activity was present between the two groups ($p>0.05$). When colonic motor activity was increased with i.v. cholecystokinin (1.0 U/kg) or pentagastrin (0.5 μg/kg), patients with irritable bowel syndrome showed a marked increase in 3-cycle/min contractile activity, occurring simultaneously with 3-cycle/min slow wave activity. These studies suggest that increased colonic 3-cycle/min slow wave activity in patients with the irritable bowel syndrome may be the basic abnormality that leads to colonic motor dysfunction in response to various physiological stimuli.

3282 COLONIC OBSTRUCTION BY GIANT PSEUDOPOLYPOSIS. (Eng.) Fitterer, J. D.; Cromwell, L. G.; Sims, J. E. (Sacred Heart Medical Center, Spokane, WA 99204). *Gastroenterology* 72(1):153-156; 1977.

The case of a 38-yr-old woman with obstructing giant pseudopolyposis of the descending colon is described. The patient had a 16-yr history of ulcerative colitis, and recurrent episodes of hematochezia were treated successfully with salicylazosulfapyridine. When the patient presented with crampy left lower abdominal pain and hematochezia that did not respond to treatment, proctoscopy revealed severe ulcerative changes and several small pseudopolyps. A barium examination showed a mass completely obstructing retrograde flow of barium at the level of the lower descending colon, and colonoscopy revealed that the mass was at the junction of the descending and sigmoid colons; the mass was lobulated and appeared to be a polypoid carcinoma. A total colectomy and ileostomy was performed. Sections through the main mass revealed it to be a group of confluent sessile to polypoid inflammatory masses consisting of hyperplastic colonic epithelium with focal acute undermined ulcers and crypt abscesses scattered throughout its surfaces. The epithelium in general was well oriented on redundant folds of lamina propria containing aggregates of chronic inflammatory cells, in some areas with germinal center formation. Undermining mucosal ulceration occurred in a well localized circumferential band of colonic mucosa immediately proximal and distal to the mass. The inflammatory infiltrate was limited to the mucosa. No granulomas, hyperplasia of the muscularis propria, serosal inflammation, or neoplastic epithelium was identified. Since carcinoma of the colon has never been reported to arise in inflammatory polyps, the authors conclude that surgery in nonobstructed patients with giant pseudopolyposis may not be necessary.

3283 DIETOTHERAPY IN COLONIC PATHOLOGY: DIFFERENT VIEWS. (Spa.) Schor, I.; Feldman, R.; Garcia, M. E.; Soifer, G. (Facultad de Medicina, Universidad Nacional de Buenos Aires, Buenos Aires, Argentina). *Arq. Gastroenterol.* 13(2):71-74; 1976.

3284 SUPERIORITY OF MEALS WITHOUT RESIDUE TO ROUTINE DIET IN SURGERY OF THE COLON STUDIED IN 95 PATIENTS. (Fre.) Bojanowicz, K.; Berner, J. (Medical Academy, Lodz, Poland). *Ann. Gastroenterol. Hepatol.* 12(7):511-518; 1976.

3285 ACCIDENTS DURING COLONOSCOPY AND COLONOSCOPIC POLYPECTOMY. (Fre.) Chabanon, R. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Ann. Gastroenterol. Hepatol.* 13(1):65-73; 1977.

3286 ANAL INVOLVEMENT DUE TO METABOLIC DISEASES. (Fre.) Garrigues, J. M. (Hopital Saint-Eloi, 34059 Montpellier Cedex, France). *Ann. Gastroenterol. Hepatol.* 12(6):367-377; 1976.

3287 CASE REPORT OF A BILHARZIAL APPENDICITIS. (Fre.) Haway, M.; De Witte, C.; Dony, A.; Deschreyer, M. (Institut Medico-Chirurgical, Boulevard Lambermont 220, B-1030 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(9/10):366-373; 1976.

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3289 POSSIBILITIES OF EARLY DIAGNOSIS OF LARGE INTESTINE CANCER. (Rus.) Zaitsev, V. N.; Kravchuk, I. P.; Denisenko, Yu. V.; Stefanenko, Yu. F. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Ter. Arkh.* 48(11):99-104; 1976.

3290 ENDOSCOPIC DIAGNOSIS OF EARLY CARCINOMA OF THE COLON. (Spa.) De la Santa Lopez, J. (Ciudad Sanitaria "Virgen del Rocio," Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(1):73-82; 1977.

3291 MULTIPLE CARCINOMA OF THE COLON AND RECTUM. THE ROLE OF RADIOLOGY. (Fre.) Ekelund, G.; Rosengren, J. E. (Malmo General Hosp., Univ. Lund, Malmo, Sweden). *Ann. Gastroenterol. Hepatol.* 12(7):461-470; 1976.

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3293 MULTIFOCAL CANCERS OF RECTUM AND COLON. IMPORTANCE OF PATHOLOGY. (Fre.) Gasbarrini, G.; Capelli, A.; Bonvicini, F.; D'Anchino, M. (Inst. Pathology, Univ. Chieti, Italy). *Ann. Gastroenterol. Hepatol.* 12(7):477-487; 1976.

3294 PHYSICAL AGENTS IN PREOPERATIVE AND POSTOPERATIVE TREATMENT OF RECTAL CANCER. (Fre.) Dubois, J. B.; Joyeux, H.; Gary-Bobo, J.; Pourquier, H.; Pujol, H.; Solassol, C. (Centre Paul-Lamarque, Cliniques Saint-Eloi, 34059 Montpellier Cedex, France). *Ann. Gastroenterol. Hepatol.* 13(1): 75-80; 1977.

3295 COLITIS ABOVE CARCINOMA: REPORT OF 7 CASES. (Fre.) Hemet, J.; Ducastelle, T.; Teniere, P.; Jouanneau, P.; Metayer, J.; Chleq, C. (Hopital Charles Nicolle, 76038 Rouen Cedex, France). *Sem. Hop. Paris* 52(38):2139-2145; 1976.

3296 SIX CASES OF PSEUDOMEMBRANOUS COLITIS DUE TO ANTIBIOTICS. (Ita.) Rizzeto, M.; Bigo, A.; Pinna, G.; Babando, G. (Ospedale Mauriziano, 10128 Torino, Italy). *Minerva Med.* 67(7):433-442; 1976.

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3298 ABNORMALITY OF THE MUSCULAR STRUCTURE OF THE COLON: A POSSIBLE CAUSE OF DIVERTICULOSIS. (Ger.) Stelzner, F. (Zentrum der Chirurgie der Universitat Frankfurt am Main, Theodor-Stern-Kai 7, D-6000 Frankfurt am Main, W. Germany). *Lange becks Arch. Chir.* 342:411-412; 1976.

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3300 THE DEVELOPMENT OF DIVERTICULOSIS AND DIVERTICULITIS. (Ger.) Stelzner, F.; Lierse, W. (Zentrum der Chirurgie der Universitat, Theodor-Stern-Kai 7, D-6000 Frankfurt/Main, W. Germany). *Langenbecks Arch. Chir.* 341(4):271-280; 1976.

3301 X-RAY FINDINGS IN DIVERTICULITIS. (Ger.) Heuck, F. (Zentral-Rontgeninstitut des Katharinenhospitals der Stadt Stuttgart, Kriegsbergstr. 60, D-7000 Stuttgart, W. Germany). *Langenbecks Arch. Chir.* 342:421-430; 1976.

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3304 FUNCTIONAL INTESTINAL OBSTRUCTION OF NEWBORNS. (Ger.) Topke, B.; Linke, M.; Menzel, K.; Genssler, W. (Medizinischen Akademie, DDR 50 Erfurt, Am Schwemmbach 32a, E. Germany). *Dtsch. Gesundheitsw.* 32(5):208-212; 1977.

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3306 GALLSTONE ILEUS. (Jpn.) Kasahara, Y.; Shiraha, S.; Umemura, H.; Tanabe, H.; Sakata, K.; Kubota, H.; *et al.* (Kinki Univ., Sch. Medicine, Sayamacho, Minamikawachi-gun, Osaka, Japan 589). *Arch. Jpn. Chir.* 45(6):487-497; 1976.

3307 THE CORRELATION OF CLINICAL, ENDOSCOPIC AND BIOPSY FINDINGS IN INFLAMMATORY ALTERATIONS OF RECTAL MUCOSA. (Ger.) Buttner, W.; Kratzsch, K. H. (Klinikum am Kuchenwald, DDR-90 Kar Marx-Stadt, Burgerstrasse 2, E. Germany). *Zentralbl. Allg. Pathol.* 120(5):406-412; 1976.

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3309 THE DIFFERENTIAL DIAGNOSIS OF MEGACOLON IN CHILDHOOD. (Ger.) Kreiner, I. (Pathologisch-anatomisches Institut der Universitat Innsbruck, Mullerstrasse 44, A-6020 Innsbruck, Austria). *Paediatr. Paedol.* 11(3):495-503; 1976.

3310 MYIASIS IN MAN: A REVIEW AND PRESENTATION OF A CASE OF INTESTINAL MYIASIS IN A CHILD. (Ger.) Lazarini, W.; Hotter, H.; Sixl, W. (Universitats-Kinderklinik Graz, Austria). *Wien. Klin. Wochenschr.* 89(2):40-43; 1977.

3311 SOLITARY POLYPS OF THE RECTUM--A DISEASE INVOLVING CANCER RISK? (Ger.) Junemann, A.; Muller, E. (Chirurgische Universitatsklinik A, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Med. Klin.* 72(8):286-293; 1977.

3312 MULTIPLE CANCER, EVIDENCE OF THE USUAL ADENOMATOUS ORIGIN OF COLONIC CARCINOMA. (Fre.) Soullard, J.; Potet, F. (Hopital Bichat, 170, bd Ney, 75877 Paris Cedex 18, France). *Ann. Gastroenterol. Hepatol.* 12(7):453-460; 1976.

3313 COLORECTAL ADENOMATOSIS (POLYPOSIS). NOSOLOGICAL AND THERAPEUTIC ASPECTS (95 CASES). (Fre.) Loygue, J. (Hopital Saint-Antoine, 184, rue du Faubourg Saint-Antoine, 75012 Paris, France). *Rev. Fr. Gastroenterol.* (125):31-34; 1977.

3314 FAMILIAL POLYPOSIS OF THE COLON, ASSOCIATED WITH EXTRACOLONIC LESIONS AND WITH A DEGENERATED POLYPOSIS OF THE STOMACH. (Fre.) Rubay, J.; Douniau, R.; Bouvy, P.; Parmentier, J. (Boulevard Devreux 26 B-6000 Charleroi, Belgium). *Acta Gastroenterol. Belg.* 39(7/8):280-292; 1976.

3315 FAMILIAL ADENOMATOUS POLYPOSIS OF THE COLON--GARDNER'S VARIANT. (Ser.) Popovic, O.; Andrejevic, M.; Bojovic, S.; Djordjevic, D.; Nadj, G.; Kusic, D. (Belgrade Clinical Hosp., Beograd, Yugoslavia). *Srp. Arh. Celok. Lek.* 104(5):379-389; 1976.

3316 THE PRESENT PLACE OF HEMORRHAGIC RECTOCOLITIS IN INTESTINAL PATHOLOGY. (Fre.) Le Quintrec, Y.; Gendre, J. P. (Hopital Rothschild, 43, bd de Picpus, F 75571 Paris Cedex 12, France). *Rev. Rhum.* 43(10):533-538; 1976.

See also, 2739, 2740, 2966, 2987, 3020, 3022, 3023, 3024, 3042, 3054, 3057, 3063, 3064, 3066, 3067, 3068, 3069, 3070, 3071, 3072, 3073, 3074, 3164, 3180, 3217, 3221, 3231, 3238, 3240, 3243, 3250, 3318, 3319, 3352, 3521, 3522, 3523, 3527, 3530, 3536, 3539, 3543, 3544, 3546, 3551, 3560, 3564, 3566, 3567, 3569, 3572, 3579.

LARGE INTESTINE

Ulcerative Colitis

3317 ZINC IN ULCERATIVE COLITIS: A THERAPEUTIC TRIAL AND REPORT ON PLASMA LEVELS. (Eng.) Dronfield, M. W.; Malone, J. D. G.; Langman, M. J. S. (City Hosp., Nottingham, England). *Gut* 18(1):33-36; 1977.

A double-blind controlled trial of p.o. zinc sulphate as adjuvant treatment in idiopathic ulcerative colitis or proctitis in relapse was undertaken in 51 patients. Twenty-six patients received zinc (220 mg zinc sulphate t.i.d. for 4 weeks), and the remainder received placebo. The patients were all receiving other medications for their disease (sulphasalazine or prednisolone). Although 46.2% of those receiving zinc showed clinical improvement by six points or more and only 32% of the controls showed similar improvement, this was not statistically significant. Sigmoidoscopy showed no significant improvement in the zinc-treated patients in comparison to the controls. No difference was found between plasma zinc levels in an additional 46 patients with idiopathic ulcerative colitis or proctitis and those obtained in healthy controls. Oral zinc sulphate is of no benefit as an adjuvant to already established treatment in the management of relapse of ulcerative colitis.

3318 REGIONAL INTESTINAL BLOOD FLOW IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Hulten, L.; Lindhagen, J.; Lundgren, O.; Fasth, S.; Ahren, C. (Dept. Surgery II, Univ. Goteborg, Goteborg, Sweden). *Gastroenterology* 72(3):388-396; 1977.

Using a recently developed isotope washout technique, regional intestinal blood flow and its intramural distribution were determined during surgery and were correlated with the morphological inflammatory and vascular features of ulcerative colitis (UC) and Crohn's disease (CD) at different stages and locations. In patients with severe UC and CD, the total blood flow was significantly increased to 64 ± 9 ml/min x 100 g, n=13; the mucosal-submucosal blood flow ammounted to 121 ± 25 ml/min x 100 g, n=7. The muscularis blood flow was within normal range (18 ± 10, n=7). In chronic, long-standing quiescent or inactive UC, in "healed colitis," and in chronic segmental colitis (CD), colonic blood flow was normal or even reduced (13 ± 2 ml/min, n=8); the decrease in flow comprised both the mucosa-submucosa (21 ± 3 ml/min, n=3) and the muscularis (7 ± 3 ml/min, n=3). In the early exudative stage of CD in the ileum, the total blood flow was normal (26 ± 5 ml/min, n=7), with a normal mucosal-submucosal blood flow (35 ± 5 ml/min, n=3). In the late fibrosing stage, total blood flow was reduced (11 ± 1 ml/min, n=6) as was the mucosal-submucosal flow (10 ± 4 ml/min, n=3). The muscularis blood flow was reduced in both these stages of ileal CD (7 ± 1 ml/min, n=6). There was a satisfactory agreement between the obtained blood flow figures and the morphologically observed vascular pattern.

3319 ERYTHEMA MULTIFORME IN ASSOCIATION WITH ACTIVE ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Chapman, R. S.; Forsyth, A.; MacQueen, A. (Stobhill General Hosp., Glasgow, G21 3UW, Scotland). *Dermatologica* 154(1):32-38; 1977.

The case reports of a patient with ulcerative colitis and a patient with Crohn's disease of the anal canal and rectum who both developed predominantly vesiculobullous skin reactions are presented. In both cases, the skin eruption appeared during an active phase of the bowel disorder and resolved as the disease was controlled. In each patient, the skin changes formed part of a symptom complex including pyrexia and oral or genital ulceration. In the first patient, a 41-yr-old woman with ulcerative colitis, arthropathy was present. The skin lesions continued to appear until systemic steroid therapy was commenced 4 weeks after the onset of bowel and skin symptoms. Total colectomy was eventually required, and the skin lesions did not recur postoperatively. In the second patient, a 49-yr-old woman with a 5-yr history of proctitis, Crohn's disease was diagnosed after an exacerbation of symptoms and the appearance of erythematous macules. A skin biopsy from a typical lesion revealed a normal epidermis, marked dermal edema, and moderately heavy focal aggregates of inflammatory cells. The patient was treated with analgesics, antacids, and salicylazosulfapyridine; the skin lesions cleared 50 days after their onset, and there have been no recurrences. The authors suggest that erythema multiforme should be accepted as a skin reaction associated with inflammatory large bowel disorder.

3320 THE ROLE OF COLONOSCOPY IN THE DIFFERENTIAL DIAGNOSIS OF INFLAMMATORY BOWEL DISEASE. (Eng.) Waye, J. D. (1065 Park Ave., New York, NY 10028). *Gastrointest. Endosc.* 23(3):150-154; 1977.

Guidelines for the use of colonoscopy in the differential diagnosis of ulcerative and granulomatous colitis are discussed. The most important application of colonoscopy in inflammatory bowel disease is in the evaluation of strictures, in the identification of pseudopolyps and their differentiation from carcinoma, in the preoperative evaluation of patients with granulomatous bowel disease, and in the evaluation of filling defects seen on barium enema examination. Thus, colonoscopy should not be carried out in all patients with inflammatory bowel disease, and it is contraindicated in a patient at the onset of acute severe ulcerative colitis.

3321 T AND B LYMPHOCYTES AND CUTANEOUS ANERGY IN INFLAMMATORY BOWEL DISEASE. (Eng.) Sachar, D. B.; Taub, R. N.; Ramachandar, K.; Meyers, S.; Forman, S. P.; Douglas, S. D.; Janowitz, H. D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Ann. N.Y. Acad. Sci.* 278:565-573; 1976.

The cellular immune status of patients with inflammatory bowel disease (IBD, both Crohn's disease and ulcerative colitis) is reported. The patients were divided into four groups: group 1 (33 patients) was taking salicylazosulfapyridine; group 2 (21 patients) was receiving steroid therapy (oral prednisone, 10-40 mg/day); group 3 (3 patients) was receiving immunosuppressive therapy (azathioprine 100-150 mg/day); and group 4 (15 patients) served as normal controls. A significant depression of mean T lymphocyte ($p<0.005$) and mean absolute T lymphocyte counts ($p<0.006$) was seen in all of the IBD groups. A corresponding increase in B lymphocytes ($p<0.025$) was found among all but the azathioprine-treated group. In the azathioprine-treated group, B cell proportions and absolute counts were depressed to control levels (13 ± 5%, 230 ± 100 cells/mm^3). No correlation was reported between lymphocyte values and extent of the disease. A high incidence of anergy upon skin testing with 2,4-dinitrochlorobenzene (DNCB) among IBD patients is reported. However, no relationship between DNCB responses and T lymphocyte levels in individual patients was shown. Research on the therapeutic response of azathioprine and further clarification of cellular immune status in IBD patients are suggested.

3322 USE OF NEROBOL AND MEXASE IN COMBINATION WITH MINERAL WATER OF THE MORSHIN HEALTH RESORT IN PATIENTS WITH CHRONIC COLITIS. (Rus.) Datsun, T. A. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (6):78-82; 1976.

3323 CLINICOPATHOLOGICAL ASPECTS OF ULCERATIVE COLITIS. (Ger.) Mihaly, F. (1122 Budapest XII, Maros 38-II-12, Hungary). *Tijdschr. Gastroenterol.* 19(3):208-216; 1976.

3324 IMMUNOLOGIC INVESTIGATIONS OF PATIENTS WITH CHRONIC ULCEROHEMORRHAGIC COLITIS.

(Bul.) Maleev, A.; Matinceva, R.; Ognjanova, M.; Vradzaliev, Z.; Kostova, N. (Medical Acad., Scientific Inst. Internal Diseases and Pharmacology, Bulgaria). *Vutr. Boles.* 15(3):32-36; 1976.

See also, 2687, 2997, 3021, 3042, 3076, 3077, 3078, 3527, 3578, 3580.

PANCREAS

3325 PANCREATIC ASCITES: DIAGNOSIS OF LEAKAGE SITE BY ENDOSCOPIC PANCREATOGRAPHY.

(Eng.) Rawlings, W.; Bynum, T. E.; Pasternak, G. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Surgery* 81(3):363-365; 1977.

The case of a patient with pancreatic ascites in whom preoperative demonstration of pancreatic anatomy by endoscopic pancreatography facilitated surgical repair of the leak is presented. The patient presented with ascites, hyperamylasemia, a history of weight loss, and crampy lower abdominal pain; a diagnosis of subacute and chronic pancreatitis was made. He was treated conservatively with parenteral alimentation, bed rest, and nasogastric suction, and the ascites were drained on two occasions. The ascites continued to reaccumulate. Endoscopic pancreatography revealed a 3 x 3 cm pseudocyst in the distal third of the pancreatic duct. X-ray films taken within the first 10 min demonstrated escape of the contrast media into the peritoneal cavity. The presence of pseudocyst was confirmed at surgery, and a distal pancreatectomy were performed. The patient's serum amylase decreased, and there was no reaccumulation of ascites. The authors suggest that endoscopic pancreatography should be done early in the clinical course of most patients with pancreatic ascites, since the information obtained can facilitate medical and surgical management.

3326 ACINAR CELL NEOPLASMS OF THE EXOCRINE PANCREAS.

(Eng.) Webb, J. N. (Western General Hosp., Edinburgh, Scotland). *J. Clin. Pathol.* 30(2):103-112; 1977.

An examination of 105 carcinomas of the exocrine pancreas revealed 12 acinar cell neoplasms, including 7 acinar cell carcinomas, 4 mixed acinar and ductal carcinomas, and 1 acinar cell adenoma. Histological and ultrastructural appearances of cells typical of these neoplasms are described. The features distinguishing acinar adenocarcinomas from the more common ductal adenocarcinomas, as well as undifferentiated carcinomas, islet cell carcinomas, oat cell carcinomas, and carcinoid tumors are discussed. The occurrence of thrombotic endocarditis in 3 of the 11 carcinomas suggest the presence of widespread fat necrosis, which has been previously noted in association with these carcinomas. The extreme malignancy of pancreatic carcinomas is stressed. Accurate histological classification of these carcinomas may be important in future epidemiological studies.

3327 THE PANCREATIC INVOLVEMENT IN DISSEMINATED "COLLAGEN" DISORDERS. STUDIES OF PANCREATIC SECRETION IN PATIENTS WITH SCLERODERMA AND SJOGREN'S "DISEASE."

(Eng.) Dreiling, D. A.; Soto, J. M. (Mt. Sinai Sch. Medicine, City Univ. New York, 100th St. & Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 66(6):546-553; 1976.

A study was made of 66 patients with Sjogren's disease and/or scleroderma to elucidate the relationship between pancreatic secretory patterns, pathological factors, and digestive complaints associated with these collagen disorders. Either pancreatic insufficiency or hypersecretion was observed in 17 of 23 patients with Sjogren's disease, 19 of 31 patients with scleroderma, and 4 patients with both Sjogren's disease and scleroderma. All of these patients suffered from digestive complaints, such as dysphagia, constipation, and diarrhea with or without steatorrhea. Abnormal gastric secretion and/or biliary flow were also frequently observed. Systemic complaints in Sjogren's disease may result from any of the following pathological factors: lupus erythematosus, Raynaud's syndrome, dermatomyositis, lymphoma, avitaminoses, and rheumatoid arthritis. However, the syndrome is most often characterized by arteritis, intestinal fibrosis, and main ductular sclerosis of the pancreas. On the other hand, digestive complaints associated with scleroderma are often due to a more widespread pathology involving many organs of the digestive system, as well as the skin and other organs, resulting from inflammatory exudates, fibrosis, arteritis, and autoimmune reactions. Therefore, diarrhea in Sjogren's disease can be readily attributed to pancreatic dysfunction, but a more complex pathology must be considered in the case of scleroderma. Since 19 of the 23 patients with Sjogren's disease, 24 of the 31 patients with scleroderma, and 3 of the 4 patients with the combined disorders had received either antibiotics, antimetabolites, and/or steroids, drug therapy is probably partially responsible for certain of these dysfunctions. However, similar dysfunctions were exhibited among a small group of patients with either Sjogren's disease or scleroderma who had received no medication. Therefore, an exact knowledge and specific treatment of all pathogenetic factors involved in each patient's particular condition would greatly improve treatment of generalized gastrointestinal syndromes.

3328 FUSION ANOMALIES OF THE PANCREATIC DUCTAL SYSTEM: DIFFERENTIATION FROM PATHOLOGIC STATES. (Eng.) Belber, J. P.; Bill, K. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Radiology* 122(3):637-642; 1977.

Comparisons were made of overall ductal contour, branching pattern, and ductal diameter in the pancreatograms of 195 patients to identify those characteristics that might clearly differentiate fusion anomalies from pathologic changes due to pancreatitis or malignancy. Seven cases were thought to represent pathologic obstruction, and eight were considered to be isolated ventral pancreatic ducts. Opacification of the parenchyma with minimal injection of contrast material occurred in seven of eight cases without any subsequent evidence of pancreatitis. On the basis of results obtained in the present study and in previous studies, the following conclusions were made. If fusion of the ventral and dorsal pancreatic ducts does not occur during fetal life, endoscopic retrograde cannulation of the papilla of Vater will visualize a small complete ductal system that is confined to the head of the pancreas. This system is characterized by normal arborizations throughout, relatively small duct diameters and the absence of a communication with the minor papilla. In contrast, if fusion has taken place and the ductal system is shortened by disease, pancreatography will demonstrate abrupt proximal termination or proximal tapering without side branches and may show a significant duct of Santorini. If the ducts have fused, an area of narrowing approximately 3-20 mm in length commonly occurs at the level of fusion. This should not be confused with pathologic ductal stenosis.

3329 BLOOD DIFFUSION OF PANCREATIC LIPASE FOLLOWING ENDOSCOPIC PANCREATOGRAPHY ASSOCIATED WITH NEPHROGRAPHY: EVIDENCE FOR ACINO PORTAL PATHWAYS IN MAN [Abstract]. (Eng.) Figarella, C.; Sahel, J.; Oi, I.; Sarles, H. (INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol.* 11(41):41; 1976.

3330 COMBINED ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERP) AND PANCREATIC ULTRASONOGRAPHY (PUSG) FOR THE DIAGNOSIS OF PANCREATIC DISEASES [Abstract]. (Eng.) Bolondi, L.; Caletti, G. C.; Fontana, G.; Vandelli, A.; Tomesani, A.; Ventrucci, M.; Labo, G. (Clinica Medica I, Universita di Bologna, Italy). *Scand. J. Gastroenterol.* 11(41):37; 1976.

3331 EFFECT OF TRASYLOL ON THE SECRETION OF THE PANCREATIC TRYPSIN INHIBITOR. (Rus.) Synovets, A. S.; Levitsky, A. P.; Khudoley, I. F. (Odessa Medical Inst., Odessa, USSR). *Vrach. Delo* (11):77-78; 1976.

3332 PANCREATIC ABSCESS WITH Haemophilus influenzae AND Eikenella corrodens. (Eng.) Lutwick, L. I. (Naval Regional Medical Clinic, Treasure Island, San Francisco, CA 94130). *JAMA* 236(18):2091-2092; 1976.

3333 INTESTINAL FISTULAS AS COMPLICATIONS OF PANCREATIC ABSCESSES. (Por.) Machado, M. C. C.; Bacchella, T.; Faintuch, J.; Alves, P. A. A.; da Cunha, J. E. M.; Mott, C. B.; Bove, P.; Raia, A. (2ª Clin. Cir. do H. Clin da FMUSP, Av. Dr. Eneas Carvalho Aguiar, CEP 05403, Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(4):241-246; 1976.

3334 THE DIAGNOSIS OF EXTERNAL PANCREATIC FISTULAS. (Rus.) Danilov, M. V.; Lokshina, K. A.; Mazaev, A. P.; Togonidze, N. A.; Zakharov, S. I. (A. V. Vishnevskii Inst. Surgery, USSR Acad. Medical Sciences, Moscow, USSR). *Sov. Med.* (12):73-78; 1976.

3335 PATHOLOGICAL BASIS OF PERSISTENT HYPERINSULINAEMIC HYPOGLYCAEMIA IN INFANTS: NESIDIOBLASTOSIS [Abstract]. (Eng.) Heitz, P.; Kloppel, G.; Hacki, W. H.; Polak, J. M.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Scand. J. Gastroenterol.* 11(41):63; 1976.

See also, 2833, 2847, 2857, 3037, 3049, 3050, 3066, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3156, 3157, 3225, 3346, 3370.

PANCREAS

Pancreatitis

336 ERYTHEMA Ab Igne, A SIGN OF PANCREATIC DISEASE. (Eng.) Butler, M. L. (Letterman rmy Medical Center, Presidio of San Francisco, San rancisco, CA 94129). *Am. J. Gastroenterol.* 67(1): 7-79; 1977.

he cases of four patients with pancreatitis and one atient with pancreatic carcinoma in whom erythema *b igne* resulting from the application of heat are resented. All patients had used a heating pad or ot water bottle on their abdomens or lower backs to elieve chronic abdominal discomfort. Two pancreaitis patients were alcoholics, one had acute choleystitis, and the fourth had no previous illness. he presence of erythema *ab igne* is a sign of oranicity, which should lead to an investigation of he pancreas as the source of the patient's pain.

337 PANCREATITIS--A RETROSPECTIVE STUDY. (Eng.) Read, G.; Braganza, J. M.; Howat, H. T. Manchester Royal Infirmary, Manchester, England). *ut* 17(12):945-952; 1976.

retrospective study of 119 patients with exocrine ancreatic disease was made to determine the factors ritical for an accurate prognosis of acute pancreatitis. The mortality and morbidity rates among atients with acute pancreatitis were much higher han among patients with relapsing acute pancreatitis r chronic pancreatitis. Acute pancreatitis afected a significantly older age group ($p<0.02$) than elapsing acute pancreatitis, the mean ages being 5.6 ± 15.7 and 44.3 ± 18.4 yr, resp. Gallstones nd extreme alcoholic intoxication were frequent tiological factors associated with relapsing acute ancreatitis, and chronic alcoholism was most comonly associated with chronic pancreatitis. No ingle clinical factor could be clearly associated ith acute pancreatitis. Pain and raised serum mylase levels were common, but not reliable sympoms of acute pancreatitis, while chronic pancreatiis was frequently associated with pain, permanent ancreatic insufficiency, steatorrhea, and diabetes, r intraductal pancreatic calculi.

338 GALLSTONE PANCREATITIS: PATHOPHYSIOLOGY. (Eng.) Kelly, T. R. (Akron City Hosp., kron, OH 44309). *Surgery* 80(4):488-492; 1976.

he stools of 45 patients with proven gallstone panreatitis were screened for gallstones. Forty-five atients with gallstones, but without pancreatitis, erved as controls. Gallstones were found in the tools of 38 of the 45 patients (84%) with gallstone ancreatitis and in only five (11%) controls. The atients with gallstone pancreatitis experienced a elief of symptoms and decreased serum amylase and ilirubin levels prior to rectal passage of the stones. perative cholangiography revealed reflux of contrast aterial into the pancreatic duct of 67% of the paients with gallstone pancreatitis and only of 18% of he controls. Of 38 patients that passed stones, 30 0 holangiograms (79%) demonstrated a functioning common channel. It appears that a functioning common channel is necessary for reflux and also favors stone passage. This study suggests that the pathophysiology of gallstone pancreatitis relates to the temporary impaction of migrating stones at the ampulla of Vater.

3339 PARACETAMOL-INDUCED ACUTE PANCREATITIS. (Eng.) Gilmore, I. T.; Tourvas, E. (St. Thomas's Hosp., London SE1 7EH, England). *Br. Med. J.* 1(6063):753-754; 1977.

The case of a patient in whom acute pancreatitis was induced by a paracetamol overdose is presented. The patient, a 31-yr-old woman with a 3-yr history of alcohol abuse, had taken 60 g of paracetamol 54 hr before she was hospitalized with severe upper abdominal pain and vomiting that lasted for 36 hr. The serum amylase level was 1,440 IU/1. The bilirubin level was 102 μM (6.0 mg/100 ml), and the alkaline phosphatase level was 10 King-Armstrong U/1. She had acute renal failure, requiring peritoneal dialysis. After 3 weeks in the hospital, her renal function returned to normal, but she had persistent abdominal tenderness, ileus, and fever. At laparotomy, 2 1 of cloudy bloodstained peritoneal fluid was found. The pancreas was edematous and hemorrhagic, with areas of fat necrosis. The liver was smooth and noncirrhotic. The patient recovered after 4 months of hospitalization.

3340 PANCREATITIS AND RENAL DISEASE. (Eng.) Robinson, D. O.; Alp, M. H.; Grant, A. K.; Lawrence, J. R. (Queen Elizabeth Hosp., Woodville Rd., Woodville, South Australia 5011). *Scand. J. Gastroenterol.* 12(1):17-20; 1977.

To study the etiology of acute pancreatitis occurring after renal transplantation, the case records of 168 renal transplant patients were surveyed; also the records of nontransplanted patients with classic renal failure who developed pancreatitis were studied. Five renal transplant patients with pancreatitis and four nontransplanted patients with pancreatitis and chronic renal failure were studied. The diagnosis of pancreatitis was established on clinical grounds and on a serum amylase level of >900 IU/1. Similar serum amylase elevation was not found in patients with chronic renal failure alone. The five transplant patients with pancreatitis were from a population of 168 renal transplant patients (3%). All five patients were being treated with prednisone and azathioprine. Among the four patients with pancreatitis and renal failure caused by polycystic kidneys, chronic pyelonephritis, or chronic glomerulonephritis, none had received immunosuppressive agents, but two were receiving regular furosemide therapy. One patient was on maintenance hemodialysis. Heavy alcohol ingestion, biliary tract disease, hyperlipidemia, and hypercalcemia were not found in any patient in either group. Three renal transplant patients with pancreatitis died, whereas all four patients with chronic renal failure survived. Although hypercalcemia and primary hyperparathyroidism were not found in the transplant and nontransplant subjects, elevated serum parathormone levels have been previously described in uremic patients with normocalcemia. This may be a factor in the development of pancreatitis in nontransplanted uremic patients.

3341 COXSACKIE AND MUMPSVIRUS INFECTION IN A PROSPECTIVE STUDY OF ACUTE PANCREATITIS.

(Eng.) Imrie, C. W.; Ferguson, J. C.; Sommerville, R. G. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gut* 18(1):53-56; 1977.

To investigate the small group of patients with "idiopathic" pancreatitis and the role of virus infection in acute pancreatitis, routine screening for viral antibodies was undertaken in 116 patients. Five patients (all female) exhibited significant rising antibody titers to Coxsackie B or mumpsvirus, while none of the remaining 111 patients did; two patients had antibody titers to mumpsvirus and two patients had antibody titers to Coxsackie B viruses types B3, 4, or 5. One patient had positive titers to mumps V and Coxsackie B5. Evidence of biliary disease was present in two of the five patients, and none of the five had any evidence of excess alcohol intake, hyperlipoproteinemia, hyperparathyroidism, or other known etiological factors. Diarrhea was a prodromal feature of the pancreatitis in the five patients with evidence of viral disease. The incidence of pancreatitis without apparent cause among the 116 patients was 5.2%. Screening of patients with acute pancreatitis for Coxsackie B and mumpsvirus infections is worthwhile in the identification of etiological factors and may minimize protracted biliary investigations.

3342 SUBCLINICAL CHRONIC PANCREATITIS IN TYPE I HYPERLIPOPROTEINEMIA.

(Eng.) Krauss, R. M.; Levy, A. G. (Donner Lab., Univ. California, Berkeley, CA 94720). *Am. J. Med.* 62(1):144-149; 1977.

A case of severe pancreatic exocrine insufficiency in a 41-yr-old man with familial type I hyperlipoproteinemia (fat-induced hyperlipemia) is described. Plasma triglyceride concentration failed to increase significantly with increased dietary fat intake, and fecal fat excretion was markedly increased (72.7-89.5 g/day). Indices of intestinal function were normal. Pancreatic enzyme therapy resulted in reduced fat excretion and increased plasma triglyceride concentration. Secretin stimulation tests revealed impaired duodenal fluid volume and bicarbonate and pancreatic enzyme responses. Insulin-dependent diabetes mellitus had been diagnosed 3-yr earlier. No attacks of acute pancreatitis had occurred in the preceding 20 yr, and pancreatic damage may have resulted from repeated subclinical pancreatic insults due to elevated plasma lipid levels. This report is the first to indicate that pancreatic exocrine insufficiency may occur as a late complication of hyperlipemic disorders in the absence of recurrent acute pancreatitis. Steatorrhea may not be apparent because of therapeutic restriction of dietary fat, and the first manifestation of pancreatic exocrine disease may be an amelioration of fat-induced hyperlipemia.

3343 MECHANISM OF INCREASED RENAL CLEARANCE OF AMYLASE/CREATININE IN ACUTE PANCREATITIS.

(Eng.) Johnson, S. G.; Ellis, C. J.; Levitt, M. D. (Univ. Minnesota Hosp., Minneapolis, MN 55455). *N. Engl. J. Med.* 295(22):1214-1217; 1976.

Three possible causes of the increased ratio of amylase/creatinine clearance observed in acute pancreatitis were investigated in 10 patients with acute pancreatitis and in 20 controls. The presence of rapidly cleared isoamylase was excluded by studies of serum and urine, which demonstrated no anomalous isoamylases. In the patients with pancreatitis, the mean ratios of both pancreatic isoamylase (9.2 ± 0.6%) and salivary isoamylase (8.6 ± 1.6%) were significantly ($p <$ 0.01) elevated over the control values (2.4 ± 0.2 and 1.8 ± 0.2%, resp.). Increased glomerular permeability to amylase was excluded by the demonstration of normal renal clearance of dextrans. Tubular reabsorption of protein was tested by measuring the renal clearance of β_2-microglobulin. During acute pancreatitis, the ratio of the renal clearance of β_2-microglobulin to that of creatinine was 1.22 ± 0.52%, an 80-fold increase over normal values (0.015 ± 0.002%); there was a rapid return toward normal during convalescence. Presumably, this reversible renal tubular defect also reduces amylase reabsorption and accounts for the elevated renal clearance of amylase/creatinine observed in acute pancreatitis.

3344 THE USEFULNESS OF STOOL SCREENING FOR DIAGNOSING CHOLELITHIASIS IN ACUTE PANCREATITIS. A DESCRIPTION OF THE TECHNIQUE.

(Eng.) Acosta, J. M.; Rossi, R.; Ledesma, C. L. (Pte. Roca 786, 1er. Piso, Rosario, Argentina). *Am. J. Dig. Dis.* 22(2):168-172; 1977.

A detailed description of the technique employed for stool screening for gallstones in patients with pancreatitis is presented. The procedure was applied in 51 patients recovering from an attack of gallstone pancreatitis, in 51 control patients with known gallstones disease but without acute pancreatitis, and in 10 patients with acute alcoholic pancreatitis. Gallstones were found in the feces in 47 of the 51 patients with gallstone pancreatitis (92.1%), in only 6 of the 51 control cases (11.8%, $p<0.0001$), and in none of the 10 patients with alcoholic pancreatitis. In the group with gallstone pancreatitis, the finding occurred within 10 days of the attack. Oral cholecystography was also accomplished an average of 12.7 days after the attack in 38 of the 61 pancreatitis patients (28 with biliary and 10 with alcoholic pancreatitis). In 27 of the 28 patients with gallstone pancreatitis (96.4%) and in 4 of the 10 patients with alcoholic pancreatitis, radiologic evidence of cholelithiasis was found. There were 19 patients with gallstone pancreatitis who did not have a cholecystogram because of jaundice, recurrent pancreatitis, previous cholecystectomy, or pregnancy. These results suggest that stool screening is as accurate and reliable as cholecystography for the diagnosis of gallstones in individuals with pancreatitis. In addition, there are no contraindications, the method requires no special equipment or personnel, and it can be used much earlier than cholecystography in patients recovering from an attack of acute pancreatitis.

3345 RADIO-ISOTOPE SCANS IN ACUTE AND CHRONIC PANCREATITIS: REPORT OF 200 EXAMINATIONS. (Fre.) Tricot, J. F.; Vinot, J. M.; Cuadrado, F.; Lenriot, J. P. (Hopital Cochin, Paris, France). *J. Chir. (Paris)* 111(3):289-296; 1976.

3346 THE IMPORTANCE OF THE SERUM LIPASE EVOCATION TEST AND RETROGRADE PANCREATICOGRAPHY FOR THE DIAGNOSIS OF CHRONIC PANCREATIC DISEASES. (Ger.) Kratochvil, P.; Brandstatter, G.; Wiedner, F.; Justich, E.; Petek, W. (Landeskrankenhauses Graz, Universitatsklinik fur Radiologie, Graz, Austria). *Med. Klin.* 72(3):79-85; 1977.

3347 E-AMINOCAPROIC ACID IN TREATMENT OF ACUTE PANCREATITIS. (Pol.) Lawinski, M.; Cisek, T.; Durek, W.; Puziewicz, I.; Tatarzynska-Nowakowska, A.; Soltys, W.; Kulpa, L. (ul. Wisniowa 36, 53-137 Wroclaw, Poland). *Pol. Przegl. Chir.* 48(8):1031-1036; 1976.

3348 EFFECT OF NEW THERAPEUTIC AGENTS FOR PANCREATITIS ON SERUM ALPHA$_1$-ANTITRYPSIN AND ALPHA$_2$-MACROGLOBULIN IN HUMANS. (Jpn.) Nakajima, S.; Ito, M.; Mizuno, F.; Nakano, H. (Fujita-Gakuen Univ. Sch. Medicine, Toyoake, Aichi, Japan). *Jpn. J. Gastroenterol.* 73(6):668-676; 1976.

3349 LONG-TERM EVALUATION OF SURGICAL THERAPY IN 53 PATIENTS OPERATED FOR RECURRENT CHRONIC PANCREATITIS. (Ita.) Pederzoli, P.; Vantini, I.; Piubello, W.; Dobrilla, G.; Serio, G.; Marzoli, G. P. (Istituto di Clinica Chirurgica dell'Universita di Padova, Sede distaccata di Verona, Italy). *Chir. Ital.* 28(2):85-93; 1976.

3350 WIRSUNG'S DUCT AND CHRONIC PANCREATITIS. CHANGES IN THE MORPHOLOGY OF THE PANCREATIC DUCTS AFTER PANCREATICO-DIGESTIVE BY-PASS OPERATIONS. 23 CONTROLLED OPERATIONS. (Fre.) Leger, L.; Blondel, P.; Lenriot, J. P.; Liguory, C. (16, rue de Teheran, 75 Paris, France). *J. Chir. (Paris)* 111(3):251-276; 1976.

3351 RESULTS OF RESECTION TREATMENT OF CHRONIC PANCREATITIS. (Ger.) Mangold, G.; Neher, M.; Oswald, B.; Wagner, G. (Chirurgische Universitatsklinik, 6500 Mainz, Langenbeckstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 102(7):229-234; 1977.

3352 TWO UNUSUAL COMPLICATIONS OF PANCREATITIS OF PARTICULAR PREOPERATIVE IMPORTANCE. (Ger.) Herold, J.; Schafer, W.; Endert, G. (Radiologische Klinik und Poliklinik, DDR-50 Erfurt, Nordhauser Str. 74, E. Germany). *Radiol. Diagn. (Berl.)* 17(6):769-772; 1976.

3353 CHRONIC PANCREATITIS IN ECTOPIC PANCREATIC TISSUE. (Por.) Duarte, M. I. S.; Mott, C. B.; Machado, M. C. C.; Lima, J. N. C. (Av. Dr. Arnaldo, 455--Dept. de Patologia da Fac. de Med. da Univ. Sao Paulo, Sao Paulo, SP., Brazil). *Arq. Gastroenterol.* 13(4):253-257; 1976.

3354 ACUTE HEMORRHAGIC NECROTIZING FORMS OF CHRONIC RECURRENT PANCREATITIS. (Ger.) Neher, M.; Mangold, G.; Schonborn, H. (Chirurgische Klinik der Universitat, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Munch. Med. Wochenschr.* 119(6):191-192; 1977.

3355 ACUTE PANCREATITIS AND HYPERLIPOPROTEINEMIA. (Ita.) Mombelloni, P.; Lazzarini, A.; Briganti, A. (Spedali Civili, Brescia, Italy). *Minerva Med.* 67(43):2823-2826; 1976.

3356 SERUM GASTRIN IN CHRONIC ALCOHOLIC PANCREATITIS. (Ita.) Ferrari, A.; Gaia, E.; Cavallero, M. (Ospedale Maggiore di S. Giovanni Battista e della Citta di Torino, Italy). *Minerva Med.* 67(43):2819-2822; 1976.

3357 DISTURBANCES IN RESPIRATORY FUNCTION IN PATIENTS WITH CHRONIC PANCREATITIS. (Fre.) Paris, J.; Guerrin, F.; Gerard, A.; Weber, J. C. (Hopital regional de Lille, 1, place de Verdun, 59000 Lille, France). *Rev. Fr. Gastroenterol.* (125):35-39; 1977.

3358 VITAMIN B$_{12}$ LEVEL IN SERUM OF PATIENTS WITH PANCREATITIS. (Pol.) Dlugosz, J.; Kaczmarski, M.; Rudobielska, M. (Klinika Chorob Dzieci AM, ul. M. Sklodowskiej-Curie 26. 15-278 Bialystok, Poland). *Wiad. Lek.* 29(23):2121-2125; 1976.

See also, 2838, 2847, 2854, 2857, 2993, 3119, 3123, 3333, 3400, 3492.

3359 QUANTITATIVE ASPECTS OF THE CONVERSION OF 5β-CHOLESTANE INTERMEDIATES TO BILE ACIDS IN MAN. (Eng.) Schwartz, C. C.; Cohen, B. I.; Vlahcevic, Z. R.; Gregory, D. H.; Halloran, L. G.; Kuramoto, T.; Mosbach, E. H.; Swell, L. (Veterans Admin. Hosp., Richmond, VA 23249). *J. Biol. Chem.* 251(20):6308-6314; 1976.

The *in vivo* conversion of several 5β-cholestane intermediates to primary bile acids was investigated in three patients with total biliary diversion. 5β-[G-^{3}H]-cholestane-$3\alpha,7\alpha$-diol, 5β-[G-^{3}H]-cholestane-$3\alpha,7\alpha,26$-triol, and 5β-[24-^{14}C]cholestane-$3\alpha,7\alpha,25$-triol were administered i.v. (6.39×10^{6} disintegrations/min [dpm], 1.25×10^{6} dpm, and 6.23×10^{5} dpm, resp.). Bile was then collected quantitatively at frequent intervals for the next 21-28 hr. The administered 5β-[G-^{3}H]cholestane-$3\alpha,7\alpha,26$-triol was efficiently converted to cholic and chenodeoxycholic acids in two patients; 61% and 75%, resp., of the administered label was found in primary bile acids. The proportion of labeled cholic to chenodeoxycholic acid was 1.20:1.02 in the bile of these patients, indicating that the C-26 triol was efficiently converted to cholic acid. The ratio of cholic to chenodeoxycholic acid (mass) in the bile of these patients was 1.23:2.32. The 5β-cholestane-$3\alpha,7\alpha$-diol intermediate was also efficiently converted (71%) to both primary bile acids. The cholic to chenodeoxycholic acid ratios by mass and label were similar (2.97 versus 2.23). By contrast, the 5β-cholestane-$3\alpha,7\alpha,25$-triol was poorly converted to bile acids in three patients. Following the administration of this compound, almost all of the administered radioactivity found in the bile acid fraction was in cholic acid (5% to 19%) and very little (<5%) was found in chenodeoxycholic acid. These findings indicate that ring hydroxylation at position 12 is not materially hindered by the presence of a hydroxyl group on the side chain at C-26 in patients with biliary diversion. The labeled C-26-triol that was efficiently converted to both primary bile acids in a proportion similar to that which was observed for the bile acids synthesized by the liver suggests that this 5β-cholestane derivative may be a major intermediate in the synthesis of both cholic and chenodeoxycholic acids.

3360 LIVER REPLACEMENT FOR ALPHA$_1$-ANTITRYPSIN DEFICIENCY. (Eng.) Putnam, C. W.; Porter, K. A.; Peters, R. L.; Ashcavai, M.; Redeker, A. G.; Starzl, T. E. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Surgery* 81(3):258-261; 1977.

The case report of a 16-yr-old girl with advanced cirrhosis and severe alpha$_1$-antitrypsin deficiency of the homozygous PiZZ phenotype who was treated by orthotopic liver transplantation is presented. After replacement of the liver with a homograft from a donor with the normal PiMM phenotype, the alpha$_1$-antitrypsin concentration in the recipient's serum rose to normal; it had the PiMM phenotype. Two years and 4 months later, chronic rejection necessitated retransplantation. Insertion of a homograft from a heterozygous PiMZ donor was followed by the identification of that phenotype in the recipient's serum. Neither liver graft developed the alpha$_1$-antitrypsin glycoprotein deposits seen with the deficiency state. These observations confirm that this hepatic-based inborn error of metabolism is metabolically cured by liver replacement.

3361 ALPHA-1 ANTITRYPSIN IN LIVER DISEASE. (Eng.) Dzambas, D.; Aleksic, N.; Klaic, A.; Prazic, B. (Inst. Chest Diseases and Tuberculosis, Novi Sad, Yugoslavia). *Acta Med. Iugosl.* 31(1):43-52; 1977.

The diagnostic value of α_1-antitrypsin was studied in 139 patients with acute hepatitis, chronic persistent hepatitis, chronic active hepatitis, and neoplasma hepatitis by the radial immunodiffusion method on agar. The mean value for α_1-antitrypsin was 276.6 ± 44.1 mg% (range 184.5-360.8 mg%). Low values were found in 26 patients (18.72%), high values in 40 (30.93%), and normal values in 70 (50.35%). In all patients with reduced α_1-antitrypsin levels, PAS-positive inclusions occurred in the cytoplasm of hepatocytes.

3362 EVIDENCE FOR RENAL CONTROL OF URINARY EXCRETION OF BILE ACIDS AND BILE ACID SULPHATES IN THE CHOLESTATIC SYNDROME. (Eng.) Summerfield, J. A.; Cullen, J.; Barnes, S.; Billing B. H. (Royal Free Hosp., Pond St., Hamstead, London NW3 2QG, England). *Clin. Sci. Mol. Med.* 52(1):51-65; 1977.

The quantities of bile acids and bile acid sulphates in the urine, serum, and bile from eight patients with intrahepatic or extrahepatic cholestasis were determined by gas-liquid chromatography and gas-liquid chromatography/mass spectrometry to test the hypothesis that urinary bile acid excretion may be controlled by the kidney. The two primary bile acids, cholic acid, and chenodeoxycholic acid, comprised approximately 94% of the total bile acids in bile, 70% in serum, and 64% in urine. The proportion of primary, secondary, and minor bile acids in bile remained relatively constant, regardless of the degree of cholestasis or the total bile acid composition. However, the primary bile acids in serum and urine tended to increase with the total bile acid concentration, with chenodeoxycholic acid frequently predominating in urine. Furthermore the concentration of minor bile acids in urine tended to rise, while that of the secondary bile acids fell with increasing total bile acid concentration, suggesting some renal synthesis of minor bile acids. Epimerization of minor bile acids may also occur in the kidney, since an epimer of cholic acid was discovered in one patient's urine. Biliary bile appeared to become more dilute with increasing severity of cholestasis, as the total bile acid concentration in the urine was negatively correlated with that in the bile. Finally, sulphation of bile acids was very low in the bile (2.1-4.6%), variable in the serum (9.3-50%), but consistently high in the urine (33-72%), the predominant sulphated compound in urine being chenodeoxycholic acid. Unlike serum, the degree of sulphatio was positively correlated with the total bile acid output in urine, indicating a much higher renal clearance of sulphated than nonsulphated bile acids.

363 SERUM-25-HYDROXY-VITAMIN-D IN UNTREATED PARENCHYMAL AND CHOLESTATIC LIVER DISEASE.
Eng.) Long, R. G.; Sherlock, S.; Wills, M. R.;
kinner, R. K. (Royal Free Hosp., London NW3 2QG,
ngland). *Lancet* 2(7987):650-652; 1976.

o determine if vitamin D metabolism is disturbed in
hronic hepatocellular disease, the serum 25-hydroxy-
itamin-D (25-OHD) concentrations were determined in
06 patients and controls. Low mean 25-OHD values
ere found in patients with untreated parenchymal
nd cholestatic liver disease. In the 9 patients
ith alcoholic hepatitis and in the 25 with alcoholic
irrhosis, the mean values were 9.8 ± 5.3 and 8.6 ±
.9 ng/ml, resp.; these values were significantly
ower than those of the controls ($p<0.001$). In six
atients with noncirrhotic chronic active hepatitis
nd 26 patients with lupoid or cryptogenic cirrhosis,
he values were 10.6 ± 6.9 and 10.8 ± 8.0 ng/ml,
esp. ($p<0.01$). Low values were also seen in acute
ulminant viral hepatitis (1.3 ng/ml), the Budd-
hiari syndrome (2.0 ng/ml), the Dubin-Johnson syn-
rome (8.7 ng/ml), and portal vein thrombosis (2.2
g/ml). The mean concentrations among 11 patients
ith symptomatic primary biliary cirrhosis, 5 with
cute large bile duct obstruction due either to car-
inoma or stones, and 11 with chronic cholestasis
ere 5.1 ± 3.8 ng/ml ($p<0.001$), 5.1 ± 4.8 ng/ml
p<0.001), and 6.4 ± 5.5 ng/ml ($p<0.001$), resp. In
even patients with presymptomatic biliary cirrhosis,
he mean value was not significantly different from
hat of controls. It is concluded that in the pres-
nce of significant parenchymal or cholestatic liver
isease, serum 25-OHD concentrations are usually low.
ow serum 25-OHD values may contribute to the etiology
f osteomalacia in chronic liver disease.

364 KINETICS OF [^{14}C]CHOLIC ACID IN FULMINANT HEPATIC FAILURE: A PROGNOSTIC
EST. (Eng.) Horak, W.; Waldram, R.; Murray-Lyon,
. M.; Schuster, E.; Williams, R. (Allgemeines
rankenhaus, Garnisongasse 13, A-1090 Vienna,
ustria). *Gastroenterology* 71(5):809-813; 1976.

he metabolism and kinetics of i.v. ^{14}C-cholic acid
ere investigated in 14 patients with fulminant
epatic failure, 24-36 hr after the development t
f grade IV encephalopathy. Radioactivity was
easured in plasma samples and in the individual
lasma bile acid fractions after separation by thin
ayer chromatography. Plasma disappearance curves
f the free ^{14}C-cholic acid were calculated by
omputerized iterative nonlinear least squares
itting procedure. The disappearance of total
lasma radioactivity was similar in all patients
nd was greatly prolonged compared with healthy
ubjects. However, the plasma disappearance of
ree ^{14}C-cholic acid was significantly faster in
he eight patients who recovered consciousness than
n the six who did not. Plasma disappearance of
ree ^{14}C-cholic acid correlated significantly with
he proportion of conjugated ^{14}C-cholate in plasma.
ll patients in whom more than 70% of plasma radio-
ctivity was in the conjugated fraction 3 hr after
njection survived and left the hospital, whereas
ll of those in whom less that 55% was conjugated died. Measuring the percentage conjugation of ^{14}C-cholate 3 hr after injection may be a useful test of residual liver function in hepatic failure, as a guide to prognosis and in evaluating new forms of treatment.

3365 GALACTOSE ELIMINATION CAPACITY AS A PROGNOSTIC INDEX IN PATIENTS WITH FULMINANT LIVER FAILURE. (Eng.) Ranek, L.; Andreasen, P. B.; Tygstrup, N. (Rigshospitalet, 9 Blegdamsvej, DK-2100 Copenhagen O, Denmark). *Gut* 17(12):959-964; 1976.

In 25 patients with fulminant hepatic failure, the prognostic value of a quantitative liver function test, the galactose elimination capacity, was assessed and compared with routine liver function tests (i.e., prothrombin, bilirubin, transaminases, and ammonia) and clinical features. The galactose elimination capacity was significantly higher ($p<0.05$) in the 5 patients who survived (17.6 ± 4.5 μmol/min/kg) than in the 20 patients who died (12.2 ± 4.3 μmol/min/kg). None of the other liver function tests was significantly different. The values of the galactose elimination capacity overlapped considerably between survivors and nonsurvivors, but all patients with a galactose elimination capacity below 12.8 μmol galactose/min/kg body weight died. The disease among most patients with a galactose elimination capacity greater than 13 μmol who died ran a subacute course. It is suggested that quantitative liver function tests be included when new treatments of fulminant hepatic failure are investigated.

3366 INTRACELLULAR ELECTROLYTE ABNORMALITIES IN FULMINANT HEPATIC FAILURE. (Eng.) Alam, A. N.; Wilkinson, S. P.; Poston, L.; Moodie, H.; Williams, R. (King's Coll. Hosp., Denmark Hill, London, England). *Gastroenterology* 72(5, Part 1): 914-917; 1977.

The sodium, potassium, and water content of peripheral blood WBC was determined in 30 patients with fulminant hepatic failure to investigate possible electrolyte abnormalities in the intracellular compartment, which might contribute toward hyponatremia in these patients. The mean potassium level was significantly lower in the patients than in 21 controls (2.95 ± 0.53 l/kg dry weight and 2.67 ± 0.07 l/kg, resp., $p<0.02$), but the sodium and water concentrations were significantly increased (123 ± 53 mmol/kg versus 80 ± 5 mmol/kg, $p<0.001$). With recovery of liver function, the WBC sodium content fell initially to below normal, with values subsequently returning to the normal range some weeks later. The WBC sodium content was inversely correlated to the plasma sodium concentration ($p<0.001$), suggesting that a shift of sodium into the intracellular compartment might contribute to the hyponatremia found in many patients with fulminant hepatic failure.

3367 H_2-RECEPTOR ANTAGONISTS AND ANTACIDS IN THE PREVENTION OF ACUTE GASTROINTESTINAL HAEMORRHAGE IN FULMINANT HEPATIC FAILURE: TWO CONTROLLED TRIALS. (Eng.) Macdougall, B. R. D.;

Bailey, R. J.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5, England). *Lancet* 1(8012):617-619; 1977.

The value of antacids and of cimetidine and metiamide in the prevention of gastrointestinal bleeding was studied in 75 patients with fulminant hepatic failure and grade IV coma. The first 25 patients were randomly allocated to treatment with or without antacid; 13 received 20 ml magnesium hydroxide every 4 hr via nasogastric tube. Twenty-six of the remaining 50 patients received metiamide (150 mg) or cimetidine (100 mg/hr) i.v. In the antacid trial, 3 of the 13 treated patients bled, while 6 of the 12 untreated patients bled; this was not a statistically significant difference. Only 1 of the 26 patients treated with a histamine H_2-receptor antagonist bled, compared with 13 of the 24 controls ($p<0.001$). Blood transfusion requirements in patients treated with H_2-receptor antagonists were significantly less than in controls (an average of 0.5 and 2.6 l, resp.). This also applied to patients treated with antacids (average 0.8 l). Two control patients who recovered from grade IV coma subsequently died from severe gastrointestinal bleeding from erosions; this was not seen in any patient treated with H_2-receptor antagonists, and all patients who recovered from grade IV coma in that group left the hospital. H_2-receptor antagonists are effective in the prevention of acute gastrointestinal hemorrhage in patients with fulminant hepatic failure.

3368 SERUM BILE ACID PATTERNS IN NEONATAL HEPATITIS AND EXTRAHEPATIC BILIARY ATRESIA.

(Eng.) Javitt, N. B.; Keating, J. P.; Grand, R. J.; Harris, R. C. (New York Hosp.-Cornell Medical Center, 525 E, 68th St., New York, NY 10021). *J. Pediatr.* 90(5):736-739; 1977.

Serum bile acid patterns were determined in 31 jaundiced infants to evaluate their usefulness in the diagnosis and management of neonatal liver disease. The infants ranged in age from 4 days to 24 weeks. Fifteen infants with extrahepatic biliary atresia had a mean concentration of serum bile acids of 90 ± 47 μg/ml; 16 infants with neonatal hepatitis had a mean concentration of 60 ± 35.5 μg/ml. The chenodeoxycholate/cholate ratio was greater than one in 13 infants (87%) with atresia and in 10 infants (66%) with neonatal hepatitis. Except for the tendency of a higher total concentration of serum bile acids in infants with atresia, a single serum bile acid value does not differentiate neonatal hepatitis from extrahepatic biliary atresia. The high proportion of chenodeoxycholate in extrahepatic atresia is different from the pattern in other types of cholestatic disease and may reflect an underlying hepatitis.

3369 ANTI-HBc TITER IN RELATION TO THE ETIOLOGICAL ROLE OF HEPATITIS B VIRUS IN PRIMARY HEPATOCELLULAR CARCINOMA.

(Eng.) Furuta, S.; Nagata, A.; Kiyosawa, K.; Akahane, Y.; Koike, Y.; Sahara, T.; Oda, M.; Mayumi, M.; Tsuda, F. (Faculty Medicine, Shinshu Univ., 3-1-1 Matsumoto, Nagano-Prefecture, Japan). *Acta Hepatogastroenterol.* 24(1):3-6; 1977.

To study the etiological role of hepatitis B virus (HBV) in relation to primary hepatocellular carcinoma (PHC), the antibody to hepatitis B core antigen (anti-HBc) in the sera of 31 PHC patients was surveyed by the immune adherence hemagglutination method. Twenty-two patients were anti-HBc-positive (71.0%), and 51.6% were hepatitis B surface antigen (HBsAg)-positive. A high anti-HBc titer ($>2^{10}$) was observed in 15 of the 22 patients who were anti-HBc-positive, reflecting possible current HBV infection. The remaining seven patients had a titer lower than 2^8; five of these patients had neither HBsAg nor anti-HBs in their sera. Among 37 anti-HBs-positive blood donors with no confirmed liver disease, 34 were anti-HBc-positive; the serum titer was less than 2^9, which may reflect previous HBV infection. The results indicate that the determination of the prevalence and the titer of anti-HBc is useful in studying the relation between HBV and PHC.

3370 A CAUSE OF HYPERAMYLASEMIA ASSOCIATED WITH CHRONIC LIVER DISEASE.

(Eng.) MacGregor, I. L.; Zakim, D. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Gastroenterology* 72(3):519-523; 1977.

In an attempt to identify the tissue of origin of hyperamylasemia in three patients with chronic active hepatitis, their serum was isoelectrically focused. The isoamylase patterns were compared to those of pancreatic and salivary amylase. The apparent salivary gland origin of the excessive blood amylase in the patients was substantiated by radiological demonstration of parotid sialoectasia in one patient and histological evidence of sialoadenitis in another. Further evidence was the coincident isoelectric points of the predominant isoamylase in the sera of the liver disease patients and of patients with parotid inflammatory disease. Hyperamylasemia associated with chronic liver disease may be of salivary gland origin and, as such, forms part of the spectrum of extrahepatic manifestations of chronic active hepatitis.

3371 LIVER-CELL-MEMBRANE AUTOANTIBODY SPECIFIC FOR INFLAMMATORY LIVER DISEASES.

(Eng.) Tage-Jensen, U.; Arnold, W.; Dietrichson, O.; Hardt, F.; Hopf, U.; Meyer Zum Buschenfelde, K. H.; Nielsen, J. O. (Kommunehospitalet, Copenhagen, Denmark). *Br. Med. J.* 1(6055):206-208; 1977.

Sera from 361 patients with various liver diseases and 274 patients with primary nonhepatic diseases, many associated with non-organ-specific autoantibodies, were examined to elucidate the disease specif city of an autoantibody directed against liver cell membrane (LMA). LMA was detected by an immunofluores cence technique using rabbit hepatocytes in 27 of 72 patients with hepatitis B surface antigen (HBsAg)-neg ative chronic active hepatitis and in 17 out of 28 patients with HBsAg-negative nonalcoholic cirrhosis. Only two patients had LMA and HBsAg, and both had chronic active hepatitis. One patient with extrahepa tic disease had LMA, and this patient had biochemical evidence of liver disease. There is a close correlation between the presence of LMA and HBsAg-negative chronic inflammatory liver disease, and its detection may help in diagnosis.

3372 SERUM α-FETOPROTEIN IN PATIENTS WITH MASSIVE HEPATIC NECROSIS.

(Eng.) Bloomer, J. R.; Waldmann, T. A.; McIntire, K. R.; Klatskin, G. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Gastroenterology* 72(3):479-482; 1977.

The serum α-fetoprotein (AFP) level was measured in 12 patients with massive hepatic necrosis to determine the time of onset of increased serum AFP relative to the duration of the illness, as this may provide information about the course of regeneration. The etiology of hepatic necrosis was viral hepatitis in 10 patients, halothane hepatitis in 1 patient, and ischemic necrosis in 1 patient. Of the 12 patients, 2 died on or before the ninth day of illness; their serum AFP levels were normal at all times (14-24 ng/ml). Increased serum AFP levels (>40 ng/ml) were not observed in any patient before the ninth day of illness. AFP levels were significantly elevated after the 9th day in eight of the nine patients who died between the 10th and 60th day of illness and in the one patient who survived. All nine patients with increased serum AFP levels exhibited histological evidence of hepatic regeneration; the remaining parenchyma showed variable degrees of pleomorphism, and the hepatocytes were arranged in thick plates, often forming rosettes and pseudoducts, some of which contained bile. These findings indicate that the rise in serum AFP in massive hepatic necrosis is related to the duration of survival after the onset of illness, but does not necessarily imply ultimate recovery. Because available evidence suggests that the serum AFP level reflects hepatic regenerative activity, it appears that the onset of regeneration in fulminant hepatitis is delayed until the second week of illness.

3373 DEFICIENT ACTIVITY OF HEPATIC PYRUVATE DEHYDROGENASE AND PYRUVATE CARBOXYLASE IN REYE'S SYNDROME.

(Eng.) Robinson, B. H.; Gall, D. G.; Cutz, E. (Hosp. Sick Children, 555 University Ave.. Toronto, Ontario, M5G 1X8, Canada). *Pediatr. Res.* 11(4):279-281; 1977.

To determine whether the hypoglycemia and lactic acidemia frequently observed in Reye's syndrome are due to decreased mitochondrial pyruvate carboxylase and pyruvate dehydrogenase, resp., the activities of these enzymes were measured in postmortem samples from six patients with Reye's syndrome and from seven controls. The activities of the two exclusively extramitochondrial enzymes, glucose-6-phosphatase and fructose-1,6-diphosphatase, were within the normal range. The activities of pyruvate carboxylase and pyruvate dehydrogenase were below the control levels in every case, the average being 21.7% of the lowest control value for pyruvate carboxylase and 11.6% of that for pyruvate dehydrogenase. Impaired pyruvate metabolism appears to be another feature in Reye's syndrome. This supports the hypothesis that nonselective deletion of mitochondrial enzymes due to disruption of mitochondrial integrity is a factor in the pathogenesis of Reye's syndrome.

3374 VITAMIN B_6 DEFICIENCY IN CHRONIC LIVER DISEASE--EVIDENCE FOR INCREASED DEGRADATION OF PYRIDOXAL-5'-PHOSPHATE.

(Eng.) Labadarios, D.; Rossouw, J. E.; McConnell, J. B.; Davis, M.; Williams, R. (King's Coll. Hosp., London, SE5 England). *Gut* 18(1):23-27; 1977.

Plasma levels of pyridoxal-5'-phosphate (PLP) and the levels of its main metabolite, 4-pyridoxic acid, were used as an index of vitamin B_6 nutrition in 31 alcoholic and nonalcoholic patients with decompensated cirrhosis or hepatitis. Plasma PLP levels were significantly lower than normal in 22 patients, the mean values for the liver disease and control patients being 3.0 and 11.7 ng/ml, resp. There was no significant difference in plasma PLP levels between those with liver disease due to alcohol and those with other liver diseases. When i.v. supplements with pyridoxine hydrochloride were given to nine patients (50 mg, b.i.d.) for 1 week, only 33% responded with an increase in plasma PLP. In contrast, all 11 patients given PLP (50 mg b.i.d., 1 week) responded, although peak plasma levels were variable, the response being significantly less than that found in normal control subjects. After supplementation with pyridoxine hydrochloride, and with PLP, the urinary excretion of 4-pyridoxic acid was higher in patients who showed the least increase in plasma PLP levels. Although impaired phosphorylation of pyridoxine hydrochloride may be one factor, the most likely explanation for these findings is an increased rate of PLP degradation, which may be important in the pathogenesis of vitamin B_6 deficiency in patients with severe liver disease.

3375 REDUCED OXIDASE ACTIVITY IN THE CAERULOPLASMIN OF TWO FAMILIES WITH WILSON'S DISEASE.

(Eng.) Gollan, J. L.; Stocks, J.; Dormandy, T. L.; Sherlock, S. (1120 HSW Dept. Medicine, Univ. California, San Francisco, CA 94143). *J. Clin. Pathol.* 30(1):81-83; 1977.

Ceruloplasmin was determined immunologically and by copper oxidase activity in 25 normal subjects, 20 patients with Wilson's disease, and 80 patients with chronic liver disease. Repeated estimation in four patients with Wilson's disease and two heterozygous mothers from two families revealed a consistent reduction in the copper oxidase activity of ceruloplasmin (12-32 U copper oxidase activity/mg ceruloplasmin) relative to the values obtained in normal subjects, patients with chronic liver disease, and other Wilson's disease patients (mean 65-79 U/mg). The functional abnormality in ceruloplasmin observed in these two families may be an inherited variant, which does not appear to be due to the presence of a serum inhibitor of copper oxidase.

3376 BREATH ANALYSIS OF MICROSOMAL FUNCTION IN HEPATIC AND EXTRAHEPATIC DISEASE [Abstract].

(Eng.) Bircher, J.; Scherrer, S.; Gikalov, I.; Preisig, R. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Eur. J. Clin. Invest.* 6(4):326; 1976.

3377 COMPARISON OF HISTOCHEMICAL STAINING AND QUANTITATIVE IRON DETERMINATION IN ROUTINE LIVER BIOPSIES [Abstract]. (Eng.) Kreeftenberg, H. G.; Gips, C. H.; Huizenga, R. (Univ. Hosp. Groningen, Groningen, Netherlands). *Digestion* 14(5/6):529; 1976.

3378 UNUSUAL RESIDUAL BODIES IN HUMAN LIVER CELLS. (Eng.) Jezequel, A. M.; Orlandi, F. (Univ. Ancona Sch. Medicine, 60100 Ancona, Italy). *J. Ultrastruct. Res.* 57(1):87-93; 1976.

3379 PREVALENCE OF LIVER DISEASE AMONG ANDROGEN TAKERS [Abstract]. (Eng.) Ogle, S. J.; Westaby, D.; Swale, J.; Randell, J.; Murray-Lyon, I. M. (Charing Cross Hosp., London, England). *Digestion* 14(5/6):538; 1976.

3380 SERUM BILE ACID ESTIMATION IN VARIOUS LIVER DISEASES [Abstract]. (Eng.) Annoni, G.; Barbi, G. L.; Bellobuono, A.; Donati, C.; Ideo, G.; Dioguardi, N. (Inst. Clinical Medicine (III), Univ. Milan, Milan, Italy). *Digestion* 14(5/6):492-493; 1976.

3381 DIMINUTION OF THE ACTIVITY OF ERYTHROCYTE DELTA-AMINOLEVULINIC ACID DEHYDRASE IN CHRONIC HEPATOPATHIES. (Fre.) Braun, A.; Koehl, C.; Abecassis, J.; Coumaros, D.; Bockel, R. (Faculte de Medecine, 11, rue Humann, F 67085 Strasbourg Cedex, France). *Nouv. Presse Med.* 5(35):2330; 1976.

3382 SERIAL DETERMINATIONS OF SERUM PSEUDOCHOLINESTERASE: A GOOD PROGNOSTIC INDEX IN LIVER DISEASE [Abstract]. (Eng.) Farini, R.; Meani, A.; Giordano, C.; Sturniolo, G. C.; Salvagnini, M.; Chiaramonte, M.; *et al.* (Dept. Gastroenterology, Univ. Padova, Padova, Italy). *Digestion* 14(5/6):508; 1976.

3383 BLOOD SERUM IMMUNOGLOBULINS IN HEALTHY SUBJECTS AND PATIENTS WITH CHRONIC INFLAMMATORY DISEASES OF THE BILIARY SYSTEM AND LIVER. (Rus.) Yepishin, A. V.; Yepishina, N. A. (Ternopol Medical Inst., Ternopol, USSR). *Vrach. Delo* (12):65-68; 1976.

3384 STUDIES ON AN IMMUNOREGULATORY FUNCTION OF HUMAN α-1-FETOPROTEIN (H-AFP) [Abstract]. (Eng.) Auer, I. O.; Kress, H. G.; Buschmann, C. (Dept. Medicine, Wurzburg, W. Germany). *Digestion* 14(5/6):496; 1976.

3385 LIPID SUBSTRATES FOR LCAT ACTIVITY IN LIVER DISEASE [Abstract]. (Eng.) Salvioli, G.; Salati, R.; Sala, B. M. (Istituto Clinica Medica, Univ. di Modena, Modena, Italy). *Digestion* 14(5/6):479-480; 1976.

3386 SERUM 25-HYDROXYVITAMIN D LEVELS IN LIVER DISEASE [Abstract]. (Eng.) Long, R. G.; Skinner, R. K.; Meinhard, E.; Wills, M. R.; Sherlock, S. (Royal Free Hosp., London, England). *Digestion* 14(5/6):478-479; 1976.

3387 OLFACTORY FUNCTION STUDIES IN CHRONIC LIVER DISEASES. (Ger.) Kleinschmidt, E. G.; Kramp, B.; Schwager, A. (Univ.-HNO-Klinik, 25 Rostock, Doberaner Strasse 137-139, E. Germany). *Z. Gesamte Inn. Med.* 31(20):853-856; 1976.

3388 GENERAL CHEMOTHERAPY OF PRIMARY AND SECONDARY CANCERS OF THE LIVER. (Fre.) Jacquillat, C.; Auclerc, G. (Hopital Saint-Louis, 2, Place du Docteur A. Fournier, 75475 Paris Cedex 10, France). *Ann. Gastroenterol. Hepatol.* 12(5): 345-348; 1976.

3389 EXPERIENCE OF INTRA ARTERIAL CHEMOTHERAPY IN PRIMARY AND SECONDARY TUMORS OF THE LIVER. (Fre.) Pettavel, J.; Morgenthaler, F. (Faculte de Medecine, Universite de Lausanne, Lausanne, Switzerland). *Ann. Gastroenterol. Hepatol.* 12(5):349-363; 1976.

3390 DETERMINATION OF MANGANESE, COPPER AND ZINC IN SERUM IN NORMAL CONTROLS AND PATIENTS WITH LIVER METASTASES. (Fre.) Versieck, J.; Hoste, J.; Barbier, F. (Academisch Ziekenhuis, Ghent, Belgium). *Acta Gastroenterol. Belg.* 39(9/10): 340-349; 1976.

3391 FAMILIAL OCCURRENCE OF HBsAg-POSITIVE HEPATOMA: TREATMENT BY ORTHOTOPIC LIVER TRANSPLANTATION AND SPECIFIC IMMUNOGLOBULIN [Abstract]. (Eng.) Johnson, P.; Wansbrough-Jones, M.; Eddleston, A. L. W. F.; Williams, R.; Calne, R. Y.; Maycock, W. d'A. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):524; 1976.

3392 FETAL PROTEINS AND HB VIRUS IN PRIMARY HEPATOCELLULAR CARCINOMA AND IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Fargion, S.; Cappellini, M. D.; de Franchis, R.; Malesci, A.; Fiorelli, G. (Inst. Clinical Medicine [III], Univ. Milan, Milan, Italy). *Digestion* 14(5/6):507; 1976.

3393 TRYPTOPHAN PLASMA LEVELS IN HEPATIC ENCEPHALOPATHY [Abstract]. (Eng.) Capocaccia, L.; Fanelli, F. R.; Calcaterra, V.; Cascino, A.; Cangiano, C. (Dept. Medicine, Univ. Rome, Rome, Italy). *Clin. Res.* 24(5):628A; 1976.

3394 NEWER THERAPEUTIC PATHWAYS IN HEPATIC ENCEPHALOPATHY [Abstract]. (Eng.) Steigmann, F.; Dourdourekas, D.; Dubin, A. (Cook County Hosp., Chicago, IL 60612). *Fed. Proc.* 36(3):1020; 1977.

3395 ABNORMAL PLATELET FUNCTION IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Rubin, M. R.; Weston, M. J.; Langley, P. G.; Bullock, G.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):545-546; 1976.

3396 GLYCOGEN STORAGE DISEASE TYPE I_B--POSSIBLE MEMBRANE TRANSPORT DEFECT [Abstract]. (Eng.) Skaug, W.; Figueroa, J.; Choate, R.; Fiser, R.; Lee, J. A.; Morris, M. D.; *et al.* (Univ. Arkansas Medical Sch., Little Rock, AR). *Clin. Res.* 25(1):70A; 1977.

3397 RESPONSE TO MEDIUM CHAIN TRIGLYCERIDES (MCT) AND CONTINUOUS INTRAGASTRIC INFUSION IN ONE PATIENT WITH GLYCOGEN STORAGE DISEASE TYPE 1 [Abstract]. (Eng.) Bhatia, M.; Blackett, P. (Univ. Oklahoma Health Sciences Center, Oklahoma City, OK). *Clin. Res.* 25(1):70A; 1977.

3398 HISTOCOMPATIBILITY ANTIGENS IN IDIOPATHIC HAEMOCHROMATOSIS [Abstract]. (Eng.) Bomford, A.; Eddleston, A. L. W. F.; Kennedy, L. A.; Batchelor, J. R.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):498; 1976.

3399 ASCORBIC ACID DEFICIENCY IN IDIOPATHIC HAEMOCHROMATOSIS [Abstract]. (Eng.) Brissot, P.; Hery, B.; Le Treut, A.; Regnouard, F.; Simon, M.; Bourel, M. (Hopital Pontchaillou, Rennes, France). *Digestion* 14(5/6):499; 1976.

3400 EARLY JAUNDICE IN PATIENTS AFTER EPIGASTRIC OPERATIONS. (Pol.) Gacyk, W.; Klimkiewicz, E. (80-211 Gdansk, ul. Debinki 7, Poland). *Pol. Przegl. Chir.* 48(11):1367-1373; 1976.

3401 PROBLEMS CONCERNING THE DIAGNOSIS AND TREATMENT OF INTRAHEPATIC LITHIASIS. (Rum.) Popa, G.; Medianu, D. (Clinica de chirurgie, Spitalul Fundeni, Rumania). *Chirurgia* 25(2):103-110; 1976.

3402 TREATMENT OF ACUTE FATAL HEPATIC NECROSIS BY TEMPORARY AUXILIARY LIVER TRANSPLANTATION. (Fre.) Ricco, J. B.; Diaz, A.; Franco, D.; Grange, D.; Gigou, M.; Bismuth, H. (INSERM U-17, Hopital Paul-Brousse, 14, avenue Paul-Vaillant-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9:349-350; 1976.

3403 HEXACHLOROPHENE-LIKE NEUROPATHY IN REYE'S SYNDROME [Abstract]. (Eng.) Partin, J. S.; Schubert, W. K.; Partin, J. C. (Dept. Pediatrics, Univ. Cincinnati, Cincinnati, OH). *Clin. Res.* 25(3):468A; 1977.

3404 AN ANATOMO-CLINICAL STUDY OF WILSON'S DISEASE IN 22 SUBJECTS FROM TWO DIFFERENT FAMILIES [Abstract]. (Eng.) Corazza, G. R.; Bonvicini, F.; Bernardi, M.; Miglio, F.; Gasbarrini, G. (Inst. Medical Pathology, Univ. Chieti, Chieti, Italy). *Digestion* 14(5/6):502-503; 1976.

See also, 2690, 2691, 2875, 2923, 2938, 2951, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3045, 3054, 3066, 3088, 3090, 3091, 3093, 3094, 3099, 3100, 3103, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3114, 3152, 3159, 3249, 3267, 3327, 3408, 3409, 3413, 3424, 3435, 3498, 3516, 3519, 3535, 3555, 3557, 3561, 3568, 3571.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

3405 THE NATURE OF THE DOSE-RESPONSE RELATIONSHIP OF PHOTOTHERAPY FOR NEONATAL HYPERBILIRUBINEMIA. (Eng.) Tan, K. L. (Univ. Singapore, Republic of Singapore). *J. Pediatr.* 90(3):448-452; 1977.

The dose-response relation of phototherapy for neonatal hyperbilirubinemia was analyzed in 110 Chinese infants having bilirubin levels of 15 mg/dl and above. The infants were subdivided into ten groups. Each group was subjected to phototherapy of different intensity with use of Philips day light (TL 20 W/54) and special blue (TLAK 40 W/03) fluorescent lamps. The 24-hr decline in bilirubin level was used to evaluate the efficacy of phototherapy. The rate of response progressively decreased with increasing radiance until a "saturation point" (585 $\mu W/cm^2$ in 425-472 nm range and 770 $\mu W/cm^2$ in 400-800 nm range) was reached, beyond which further increases in radiance serve no purpose. There was a 37% reduction in bilirubin level at the saturation point. Blue lamps (24 hr decline, 4.3-6.7 mg/dl) were more efficient than white lamps (24 hr decline, 1.6-4.7 mg/dl). The minimal regression at which phototherapy is effective was 15.25 $\mu W/cm^2$ in the 425-475 nm range and 16.29 $\mu W/cm^2$ in the 400-480 nm range. Time required for bilirubin levels to decrease to less than 11 mg/dl was shortened (2 days) in groups receiving increased radiance. Pyrexia, the main disadvantage of intense phototherapy, was controlled effectively by increasing ventilation. No infant had to undergo phototherapy a second time for recurrent hyperbilirubinemia.

3406 TEMPORARY INTESTINAL LACTASE DEFICIENCY IN LIGHT-TREATED JAUNDICED INFANTS. (Eng.)

Bakken, A. F. (Rikshospitalet, Univ. Oslo, Oslo 1, Norway). *Acta Paediatr. Scand.* 66(1):91-96; 1977.

To determine whether the diarrhea seen in six newborn, jaundiced infants treated with light was due to a temporary inhibition of the intestinal brush-border lactase by increased amounts of unconjugated intestinal bilirubin, their intestinal lactase activity was measured by the lactose tolerance test and compared to that in eight normal controls. The ability to hydrolyze lactose was minimal in the jaundiced infants during light-treatment, compared to the controls in whom lactose was well absorbed. The histochemical investigation of p.o. intestinal biopsy specimens revealed no intestinal lactase activity in the jaundiced infants. When the jaundiced infants were given lactose-free diets, the stools normalized. The effect was reversed when breast milk was given while the infants were still jaundiced and light-treated. These findings indicate that the increased amounts of unconjugated bilirubin in the intestine of jaundiced infants during light-treatment inhibit the intestinal brush border lactase. When the icterus fades, the lactase is again active. Thus, light-treated infants with diarrhea should be given a lactose-free diet; when the baby is no longer icteric, breast milk or other lactose-containing diet can be reintroduced.

3407 CONJUGATED HYPERBILIRUBINEMIA IN INFANCY ASSOCIATED WITH PARENTERAL ALIMENTATION.

(Eng.) Bernstein, J.; Chang, C. H.; Brough, A. J.; Heidelberger, K. P. (William Beaumont Hosp., Royal Oak, MI 48072). *J. Pediatr.* 90(3):361-367; 1977.

Histopathologic and electron microscopic studies of liver biopsy, done to exclude anatomic obstruction of the biliary tract in five prematurely born infants (32 to 34 weeks) showing respiratory distress syndrome, are presented. These infants developed conjugated hyperbilirubinemia during i.v. alimentation with Cutter casein protein hydrolysate (2.5 g/kg/day). Each had undergone a segmental intestinal resection for necrotizing enterocolitis. The biopsies in all five infants showed cholestasis and hepatocellular damage. Four of these infants had hyperbilirubinemia, with serum concentrations greater than 2.0 mg/dl (4-7 weeks). One infant developed a concentration of bilirubin of 1.7 mg/dl on the 63rd day of life. Maximal concentrations of bilirubin (4.1-12.6 mg/dl) occurred from 7 to 15 weeks after surgery. There appeared to be little correlation between the degree of bile stasis and hyperbilirubinemia. Cholestasis was most severe in the central portions of the lobules, where distended canaliculi contained plugs of greenish-brown material. The hepatocytes were swollen, with vesiculation of the peripheral cytoplasm, and contained large amounts of granular bile and lipofuscin pigment. Liver cells from two biopsy specimens contained small tangles of smooth membranes, corresponding to the abnormality "microsomal lipid peroxidation." Present findings implicate the protein hydrolysate in the hepatic abnormality, because jaundice always subsided following permanent discontinuation of i.v. alimentation.

3408 DIAGNOSTIC SIGNIFICANCE OF ALPHA-FETOPROTEINS IN NEONATAL HYPERBILIRUBINAEMIAS AND PRIMARY CANCER OF THE LIVER IN ADULTS. (Eng.)

Milosavljevic, J.; Stajic, M.; Vilhar, N. (General Hosp. Zemun, Vukova 9, 11080 Zemun, Yugoslavia). *Acta Hepatogastroenterol.* 24(1):30-33; 1977.

The frequency of serum α-1-fetoprotein (AFP) was determined by immunoprecipitation electrophoresis in 16 patients with primary hepatocellular carcinoma and in 50 neonates with hyperbilirubinemia. Among 94 healthy control infants under 14 days of age, AFP was detected in all but two; AFP did not occur in the sera of 20 control infants aged 20-30 days, nor was it present in adult controls. AFP was present in 15 of 16 jaundiced neonates under 7 days of age and was present in all 13 7- to 14-day-old jaundiced infants. Among seven 15- to 21-day-old jaundiced infants, six sera were AFP-positive. Only one of five 22- to 30-day-old infants were AFP-positive, but AFP was present in nine 1- to 3-month old infants with bile duct malformations. Among the 16 patients with liver cancer, 43.7% had AFP-positive sera, while none of 40 adults with other cancers had AFP. AFP in adult subjects indicates primary hepatocellular carcinoma in the liver; however, the absence of AFP does not necessarily rule out this diagnosis.

3409 DIFFERENTIAL DIAGNOSIS OF PERSISTENT CHOLESTATIC JAUNDICE IN INFANCY. (Eng.)

Poley, J. R. (Zentrum fur Innere Medizin und Kinderheilkunde, Universitats-Kinderklinik, Prittwitzstrasse 43, 79 Ulm, Donau, W. Germany). *South. Med. J.* 70(1):91-94; 1977.

The differential diagnosis of persistent cholestatic jaundice in infancy is reviewed, with particular emphasis on the diagnosis of biliary atresia. Most infants with persistent cholestatic jaundice have either a form of neonatal hepatitis, biliary hypoplasia, or biliary atresia. Intrahepatic cholestasis is caused by neonatal hepatitis (more appropriately designated neonatal hepatic inflammatory disease), α_1-antitrypsin deficiency, Byler's disease, and familial recurrent cholestasis, with or without lymphedema. The most common cause of obstruction of the extrahepatic biliary tree is the fibrous obliteration and scarring of portions of the hepatic ducts and/or the common duct. The extrahepatic ductal system may even be completely absent, while the true atresia of the common duct or the hepatic ducts is less common. Cholestyramine-based tests and the determination of 5'-nucleotidase levels are the most useful tests for the diagnosis of biliary atresia. The latter is useful in distinguishing between intrahepatic and extrahepatic cholestasis. In one study, 5'-nucleotidase levels were consistently higher in biliary atresia (9 patients) than in neonatal hepatitis (27 patients). The cholestyramine-based tests include cholestyramine combined with either the iodinated rose bengal xcretion test or the quantitative determination f lipoprotein X (LP-X). The latter test is the ost useful. The absence of LP-X in the serum of a aundiced infant beyond 4 weeks of age rules out the iagnosis of biliary atresia.

410 THE CLINICAL, NOSOGRAPHICAL, PHYSIOPATHOLOGICAL AND THERAPEUTIC FEATURES OF GIL-
ERT'S ICTERUSES AT THE PRESENT TIME. THE PHENO-
ENON OF ENZYMIC INDUCTION AT THE LEVEL OF THE LIVER.
Ita.) Lovisetto, P.; Giorcelli, W.; Actis, G. C.; iarese, V. (Istituto di Clinica Medica Generale e erapia Medica I dell'Universita degli Studi, orino, Italy). *Minerva Med.* 67(45):2903-2908; 976.

411 A HANDY NEW METABOLIC TEST FOR GILBERT'S SYNDROME DIAGNOSIS [Abstract]. (Eng.)
rezza, M.; Quaranta, C.; Piccinini, C.; Tiribelli, . (Istituto Patologia Medica, Univ. Trieste, Trieste, Italy). *Digestion* 14(5/6):512-513; 1976.

3412 STUDIES ON THE MECHANISM OF FASTING HYPERBILIRUBINAEMIA IN GILBERT'S SYNDROME [Abstract]. (Eng.) Okolicsanyi, L.; Orlando, R.; Cortelazzo, S.; Ortolani, C.; Dal Brun, G.; Naccarato, R.; Federspil, G. (Istituto di Clinica Medica I dell'Universita di Padova, Padova, Italy). *Digestion* 14(5/6):483; 1976.

See also, 2888, 3425.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

413 NEONATAL HEPATITIS AND ALPHA-1-ANTITRYPSIN DEFICIENCY: THE PROGNOSIS IN FIVE
ATIENTS. (Eng.) Hirschberger, M.; Stickler, G. B. Mayo Graduate Sch. Medicine, Rochester, MN). *Mayo lin. Proc.* 52(4):241-245; 1977.

ive patients who presented with the neonatal hepaitis syndrome associated with α-1-antitrypsin (α-1-AT) eficiency (PiZ) were followed for up to 21 yr. o patients developed cirrhosis at ages 5 and 8 yr, esp. The duration of neonatal cholestasis in these atients was 3 and 2 months, resp., and their α1AT evels at the time of cholestasis were 78 and 45 g/dl, resp. The 8-yr-old patient has ascites and levated SGOT; the other patient is clinically well, ut the SGOT and alkaline phosphatase levels are levated, and psychomotor development is delayed. he three remaining patients, aged 1, 9, and 21 yr, re asymptomatic. The first two patients have nor- l liver function tests, and the latter patient s a mild elevation of SGOT (51 U/l). She is linically well, except for a seizure disorder. The iver biopsy revealed mild portal fibrosis with reserved lobular architecture. The prognosis for atients with α-1-AT deficiency (PiZ) presenting with eonatal hepatitis is not necessarily grave, a findng that differs from previous observations.

14 STUDY OF AN EPIDEMIC OF JAUNDICE, PRESUMABLY DUE TO TOXIC HEPATITIS, IN NORTHWEST
NDIA. (Eng.) Tandon, B. N.; Krishnamurthy, L.; oshy, A.; Tandon, H. D.; Ramalingaswami, V.; handari, J. R.; *et al.* (All-India Inst. Medical ciences, Ansari Nagar, New Delhi-110016, India). *astroenterology* 72(3):488-494; 1977.

Detailed clinical features, appropriate laboratory tests, and liver biopsies were studied in 200 patients in whom an epidemic of jaundice, probably due to toxic hepatitis, occurred. The epidemic affected dogs first, then the humans in three adjoining districts in India. A retrospective epidemiological survey was carried out. The disease had a subacute onset, starting with high fever followed by rapidly progressive jaundice. Ascites appeared simultaneously and soon became quite massive. Hepatomegaly was recorded when ascites decreased. Liver function tests suggested cholestatic jaundice. The mortality rate in the hospital was 10%. Clinical features in dogs were similar, but mortality was almost 100%. Liver histology was characterized by edema and collagenization of the central veins, never with thrombosis; cholangiolar proliferation; moderate to severe ballooning of the hepatocytes; perisinusoidal fibrosis; cholestasis; and finally, cirrhosis with reverse lobulation. The etiology of this hepatitis epidemic could not be unequivocally established; critical analysis of the data suggests that some food toxin may have been a factor in the outbreak.

3415 REVERSIBLE OXACILLIN HEPATOTOXICITY. (Eng.) Olans, R. N.; Weiner, L. B. (Upstate Medical Center, 750 East Adams St., Syracuse, NY 13210). *J. Pediatr.* 89(5):835-838; 1976.

The cases of eight patients with reversible hepatotoxicity secondary to the administration of oxacillin are presented. The patients included seven children, ranging in age from 10.5 months to 10.5 yr, and a 31-yr-old man. The patients received oxacillin (150-400 mg/kg/day, i.v.) for 9-35 days in the treatment of staphylococcal infections. All patients developed elevated SGOT and SGPT levels (maximal values 136-1,110 IU and 31-1,359 IU, resp.), but all remained asymptomatic and anicteric. Peripheral eosinophilia was present in five patients. Two to six days after nafcillin or penicillin G was substituted for oxacillin, the liver enzyme levels began to drop, and they returned to normal in 3-180 days. Change of medication to an alternative penicillinase-resistant penicillin or to penicillin G is suggested as a safe procedure for completion of antistaphylococcal therapy in patients who develop oxacillin-related hepatotoxicity.

3416 FREQUENCY OF RENAL IMPAIRMENT IN PARACETAMOL OVERDOSE COMPARED WITH OTHER CAUSES OF ACUTE LIVER DAMAGE.

(Eng.) Wilkinson, S. P.; Moodie, H.; Arroyo, V. A.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5, England). *J. Clin. Pathol.* 30(2):141-143; 1977.

To determine whether paracetamol overdose has a specific nephrotoxic action, the frequency of renal failure was analyzed in 160 patients with fulminant hepatic failure and grade IV encephalopathy, separated according to etiology. In addition, the frequency of renal failure in 90 cases of paracetamol overdose with less severe hepatic damage was compared with that found in 100 cases of acute viral hepatitis with comparable abnormalities in liver function tests, and assays for endotoxin were carried out in 14 patients with paracetamol overdose. Although the frequency of renal failure appeared to be higher in the 53 patients with paracetamol overdose (53%) than in the 68 patients with acute viral hepatitis (38%) or in hepatic failure attributable to other causes (38%), none of the differences achieved statistical significance. Similar results were achieved in the 90 patients with less severe hepatic damage. Thirteen of 14 patients with fulminant hepatic failure from paracetamol overdose who had developed renal failure had a positive *Limulus* lysate assay for systemic endotoxemia, compared with only 1 of the 7 tested who did not have renal failure ($p<0.001$). In 21 patients with fulminant hepatic failure due to other causes in whom the *Limulus* assay was performed, the assay was positive in all 12 with renal failure, but negative in the other 9 ($p<0.001$). Similarly in eight patients with less severe liver damage due to paracetamol, a positive assay was obtained in only the two patients with renal failure ($p=0.05$). The findings do not support the concept that paracetamol, taken in overdose, has a specific nephrotoxic action, but do support the hypothesis that renal failure in fulminant hepatic failure is related to endotoxemia.

3417 OCCUPATIONAL PATHOLOGY OF THE LIVER PROVOKED BY TOLUYLENE-DIISOCYANATE.

(Rus.) Sharonova, Z. V.; Kryshanovskaya, N. A. (Inst. Indus trial Hygiene and Occupational Diseases, Gor'kii, USSR). *Gig. Tr. Prof. Zabol.* (11):27-31; 1976.

See also, 3152.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

3418 HEPATITIS B INFECTIONS IN EXPATRIATE DOCTORS IN PAPUA NEW GUINEA.

(Eng.) Woodfield, D. G. (Auckland Blood Transfusion Service, P.O. Box 5546, Wellesley St., Auckland C1, New Zealand). *Med. J. Aust.* 2(16):595-596, 598-599; 1976.

The clinical and serological effects of transferring to an area of high hepatitis B surface antigen (HBsAg) prevalence were studied by determining the frequency of hepatitis B infection in European doctors and in nonmedical expatriates working in Papua New Guinea. The average length of residence in New Guinea for doctors was 5.09 yr (range 0.08-30.0 yr). Clinical hepatitis was reported in 42 of 189 doctors, and 29 of these doctors reported hepatitis while in New Guinea. The total person-years of residence in New Guinea was 962, representing an overall risk for all age groups of 3.01%. Among 115 blood samples received from the doctors, evidence o exposure to hepatitis B virus was found in 48 (41.7%). Of the 22 doctors with hepatitis, 15 (68.2%) had HBsAg or antibody to HBsAg (anti-HBs), a significantly higher proportion than doctors with out clinical hepatitis (35.3%, $p<0.001$). Among the 636 nonmedical expatriates who had lived in New Guinea for a mean of 5.94 yr (range 0.08-36.0 yr), the frequency of hepatitis was 10.7%, with 5.0% of the hepatitis occurring in New Guinea. The over all risk for hepatitis was 1.8%, a figure similar to that reported for American missionaries abroad.

3419 CONTAGIOUSNESS OF ACUTE HEPATITIS B: SEC ONDARY ATTACK RATES IN HOUSEHOLD CONTACTS

(Eng.) Koff, R. S.; Slavin, M. M.; Connelly, L. J. D.; Rosen, D. R. (Veterans Admin. Hosp., 150 South luntingdon Ave., Boston, MA 02130). *Gastroenterology* 72(2)297-300; 1977.

o define the hazard of household exposure to patients ith acute hepatitis B, in the absence of persistent epatitis B surface antigen (HBsAg), 98 household ontacts of 42 patients with the acute disease were nterviewed and tested for HBsAg, antibody to HBsAg anti-HBs), and serum transaminases shortly after dentification and at 3-month intervals for at least 2 months. Most of the index cases with acute hepaitis B were young men, and many had used illicit rugs parenterally before the onset of illness. At he initial testing, HBsAg was detected in three ousehold contacts, and two of these were carriers ith elevated serum transaminase levels. The third BsAg-positive contact developed acute hepatitis ithin 2 weeks. This appeared to represent a corimary infection. Fourteen contacts had anti-HBs n initial evaluation and were considered to be mmune as a result of prior experience with hepaitis B. Of 81 susceptible contacts (neither BsAg nor anti-HBs on initial screening), 13 were pouses or sexual partners, and 2 of these developed cute hepatitis B at 4 and 6 months after the onset f illness in their respective index cases; another eveloped anti-HBs at 6 months. Thus, 3 (23%) of 13 xposed spouses or sexual partners developed evience of hepatitis B infection during the surveilance period. In contrast, no evidence of hepatitis infection related to household exposure was found n 68 parents, siblings, and other domestic contacts. hese data confirm the contagiousness of hepatitis for household contacts of acute cases and suggest hat the risk is confined to spouses and sexual artners. These persons appear to be prime candiates for prophylaxis with hepatitis B immune globlin.

420 NOSOCOMIAL VIRAL HEPATITIS B: A CLUSTER AMONG STAFF WITH SUBSEQUENT TRANSMISSION 0 PATIENTS. (Eng.) Snydman, D. R.; Hindman, S. H.; ineland, M. D.; Bryan, J. A.; Maynard, J. E. Center Disease Control, Atlanta, GA 30333). *Ann. ntern. Med.* 85(5):573-577; 1976.

n outbreak of nosocomial hepatitis B among hospital taff and patients is described. In a 2-month perod, four cases of hepatitis B occurred in hospital taff. Three months later, two patients, hospitalzed for open-heart surgery when the staff members ad been infected, developed acute hepatitis B. era from all six ill individuals were subtype *ayw* and -determinant positive. Epidemiologic investigation howed that the four staff members had been exposed months earlier to an asymptomatic hepatitis B urface antigen (HBsAg)-positive patient who was also positive. To determine transmission from staff to atients, a study of 17 open-heart surgery patients as undertaken. Four of 17 were either HBsAg- or anti-Bs (antibody to HBsAg)-positive. No correlation beween infection and contact with three of four ill taff members or receipt of blood products was noted. owever, 22 (46%) of 48 arterial blood gas specimens ad been obtained from infected patients by one staff ember; this compared with seven (4%) of 157 specimens she obtained from control subjects ($p<0.001$). Furthermore, she handled indwelling arterial cannulae 25 (76%) of 33 times in infected patients, compared with 3 (3%) of 95 times in control subjects ($p<0.001$). Transmission may have occurred via the arterial cannulae from a severe exudative dermatitis on the therapist's hands.

3421 REACTIVATION OF HEPATITIS B AFTER TRANSPLANTATION OPERATIONS. (Eng.) Nagington, J.; Cossart, Y. E.; Cohen, B. J. (Public Health Lab., Hills Rd., Cambridge CB2 2QW, England). *Lancet* 1(8011):558-560; 1977.

A transplant and dialysis unit has been monitored for hepatitis-B virus (HBV) infection since 1968. The onset of antigenemia occurred in six patients. When the first serum of each patient admitted was examined for the antibody to hepatitis B core antigen (anti-HBc), 23 of 380 patients were positive. Since the presence of anti-HBc is taken to be evidence of previous infection, the occurrence of antigenemia in three of the positives when they were immunosuppressed after transplantation is believed to be due to reactivation of latent infection. This is a new factor to be considered in the control of hepatitis B after transplantation.

3422 VIRAL HEPATITIS IN INFANTS DURING THE FIRST SIX MONTHS OF LIFE (CLINICO-LABORATORY CHARACTERISTICS). (Rus.) Bulatkina, F. G. (Dept. Infectious Diseases in Children, Leningrad Pediatric Medical Inst., Leningrad, USSR). *Pediatriia* (7):24-26; 1976.

A group of 309 children (<6-months-old) with viral hepatitis (VH) was surveyed. During pregnancy, 33.3% of patients' mothers had toxicosis and hypertension; 38.4% had premature birth; 31.3% of children had a history of pneumonia; and 9.1% had sepsis. Severe forms of VH were observed in 48.2% of the children (lethality 11.3%). Severe VH was recorded in 54.1% of 3-month-old children, compared to 36.1% of 6-month-old children. The disease was acute in 89.4% of the patients, protracted in 8.7%, and chronic in 1.9%. Duration of the preicteric period comprised only 3.8 to 5.65 days. First symptoms were enlargement of the liver (85.4%), loss of appetite (34.2%), and vomiting (26.6%). Duration of the icteric period ranged from 21.3 to 69.2 days. Children with icteric hepatitis had elevated bilirubin levels (11.8 ± 0.5 mg%, compared to 2.8 ± 0.2 mg% in controls) and significantly decreased prothrombin levels (53.6 ± 2.8% in patients with severe VH, and 14.0 ± 3.3% in patients in coma). The most characteristic features of VH in these infants were the severity and irregularity of the course.

3423 TREATMENT OF ACUTE LIVER DYSTROPHY IN VIRAL HEPATITIS DURING PREGNANCY. (Rus.) Farber, N. A.; Ketiladze, E. S.; Gubsky, L. V.; Malyshev, N. A. (D. I. Ivanovsky Inst. Virology, Acad. Medical Sciences USSR, Moscow, USSR). *Ter. Arkh.* 48(12):40-45; 1976.

During 1956-1975, 1,357 pregnant women underwent treatment for viral hepatitis (14 patients died of acute hepatic insufficiency). The incidence of serum hepatitis and infectious hepatitis among the pregnant women was 73.6% and 7.2%, resp., compared to 46.2% and 37.8%, resp., among nonpregnant patients. The frequency of hepatitis B antigen was found to be significantly greater among the pregnant women (45.7%) than among the nonpregnant women (34.3%). The case histories of three patients with serum hepatitis and jaundice are presented (hepatitis B antigen was detected in 2 patients). Two patients had 30-week and 39-week pregnancy, resp., and the third patient was admitted after premature delivery. They developed acute hepatic insufficiency with encephalopathy (drowsiness, disorientation, mental confusion); all patients showed marked diminution of the liver, progressively worsened jaundice, and decreasing prothrombin and sublimate test indices. All three patients had negative diuresis, with pronounced retention of fluid, and edema. Treatment included diuretics, attempts to control cerebral edema, and immunotherapy with gammaglobulin and hepatitis B antibody-containing plasma. All patients were discharged from the hospital in good health.

3424 VIRAL HEPATITIS AND THE PROBLEM OF CHOLESTASIS IN PREGNANT WOMEN.

(Rus.) Rychnev, V. E. (Dept. Infectious Diseases, Rostov Medical Inst., Rostov-on-Don, USSR). *Vrach. Delo* (10):134-139; 1976.

Of 334 pregnant women with jaundice of different etiologies, 84 had jaundice due to the intrahepatic cholestasis (cholestatic hepatosis, CH). First symptoms of CH were pruritus, pain in the right hypochondrium and epigastrum, loss of appetite, and vomiting; 51% of the patients had enlargement of the liver, and 11% had enlargement of the spleen. Of 84 patients with CH, 14 had premature birth, and 11 had metrorrhagia immediately after delivery. Perinatal child lethality was 20 ± 6%. Of 51 women with CH who were followed up for 5 yr, 4 developed chronic hepatitis, and 25 had lesions of biliary ducts and gallbladder; only 20 women were disease-free.

3425 CLINICAL SIGNIFICANCE OF SEPARATE QUANTITATIVE ASSESSMENT OF BILIRUBIN MONOGLUCURONIDE AND BILIRUBIN DIGLUCURONIDE IN THE BLOOD SERUM OF PATIENTS WITH JAUNDICE OF DIFFERENT ETIOLOGY.

(Rus.) Sorinson, S. N.; Vanesyan, A. S. (S. M. Kirov Medical Inst., Dept. Infectious Diseases, Gor'kiy, USSR). *Ter. Arkh.* 49(2):67-69; 1977.

Fractional analysis of hyperbilirubinemia was performed in 245 patients with jaundice of different etiologies. There were 155 patients with viral hepatitis, 21 with functional hyperbilirubinemia, 17 with hemolytic disease, 31 with chronic hepatitis and cirrhosis, and 21 with neoplasms. The combined Nosslin diazotest and extractive Weber-Schalm test were used for quantitative assessment of bilirubin monoglucuronide (BMG) and bilirubin diglucuronide (BDG) fractions in blood serum. Patients with viral hepatitis showed a gradual and progressive increase in the BMG content from 1.15 ± 0.03 mg% in patients with mild disease to 7.03 ± 1.3 mg% in patients with severe disease. The BMG level was 0.31 ± 0.06 mg% in patients with hemolytic disease 0.9 ± 1.17 mg% in patients with chronic hepatitis, 3.3 ± 0.9 mg% in patients with cirrhosis, 4.7^{7} ± 0.6 mg% i patients with neoplasms, and 0.05 ± 0.004 mg% in healthy controls. The BDG content was the most useful in distinguishing jaundice associated with neoplasms (8.49 ± 0.9 mg%) from jaundice due to viral hepatitis (2.58 ± 5.3 mg%).

3426 DETECTION, BY THREE TECHNIQUES, OF HEPATITIS B SURFACE ANTIGEN (HBsAg) AND DETERMINATION OF HBsAg AND ANTI-HBs TITRES IN PATIENTS WITH CHRONIC LIVER DISEASE.

(Eng.) Chiaramonte, M.; Heathcote, J.; Crees, M.; Sherlock, S. (Clinica Medica 1, Univ. Padova, Padova, Italy). *Gut* 18(1): 1-6; 1977.

The sensitivities of three techniques used to detect serum hepatitis B surface antigen (HBsAg) were compared in 411 patients with chronic liver disease. Counterimmunoelectrophoresis was an unreliable test as only HBsAg titers exceeding 1:256 could be detected. Two hemagglutination techniques were slightly less sensitive than radioimmunoassay, but were more rapidly performed. Less sensitive techniques were particularly unreliable in active liver disease where HBsAg titers were low. HBsAg was detected in patients with chronic persistent hepatitis, alcoholic liver disease, chronic active liver disease with or without cirrhosis, and primary liver cell carcinoma. Forty-six of the 68 (68%) HBsAg-positive subjects were males coming from outside the United Kingdom. The HBsAg titers in 13 subjects with chronic persistent hepatitis were significantly higher ($p<0.001$) than those in 43 subjects with chronic active liver disease. Corticosteroid therapy did not alter the HBsAg titer significantly. None of the 28 HBsAg-positive subjects studied serially for up to 2 yr cleared HBsAg from the serum. Antibody to HBsAg (anti-HBs), analyzed by passive hemagglutination, was found in 35 subjects, 26 of whom had no evidence of liver disease; 80% came from abroad. Anti-HBs was believed to be of epidemiological rather than of pathological importance.

3427 CELL-MEDIATED IMMUNITY IN HEPATITIS B INFECTION.

(Eng.) Galbraith, R. M. (King's Coll. Hosp., London, England). *Minerva Gastroenterol.* 22(3):233-234; 1976.

A brief review of factors contributing to the hypothesis that the degree of liver damage resulting from hepatitis B infection is related to the immune response to the viral antigens is presented. The existence of perfectly healthy individuals with large amounts of hepatitis B surface antigen both in the liver and in the serum, but with no detectable liver disease, makes it unlikely that the hepatitis B virus is directly cytopathogenic.

28 FAILURE OF SPECIFIC IMMUNOTHERAPY IN FULMINANT TYPE B HEPATITIS. (Eng.) Acute

patic Failure Study Group. (Univ. Southern Califor-
a Sch. Medicine, Los Angeles, CA 90007). *Ann.*
tern. Med. 86(3):272-277; 1977.

i.v. hepatitis B immune globulin preparation for
e treatment of fulminant type B hepatitis was eval-
ted in 53 patients. Hepatitis B surface antigen-
sitive patients were treated at stage II to stage
of hepatic encephalopathy. A central computer
ogram randomized cases for treatment with hyper-
mune globulin or albumin placebo. During the
rst 6 months, the dose of hepatitis B immune glob-
in was 1.32 g of immunoglobulin G protein; during
e last 7 months, it was 5.28 g. Neither dose
iminated antigenemia. In the placebo group, death
curred in 4 of 8 cases randomized at stage II, 5
8 at stage III, and 10 of 12 at stage IV. In the
oup treated with hyperimmune globulin, death
curred in 3 of 5 patients randomized at stage II,
of 12 at stage III, and 6 of 8 at stage IV. The
sults suggest that administration of exogenous
tibody is not beneficial in the treatment of ful-
nant type B hepatitis.

29 RELEASE OF e ANTIGEN FROM A DANE PARTICLE-RICH PREPARATION OF HEPATITIS B VIRUS.

ng.) Lam, K. C.; Tong, M. J.; Rakela, J. (Univ.
uthern California Sch. Medicine, Downey, CA 90242).
fect. Immun. 16(1):403-404; 1977.

e suggestion that the e antigen (HBeAg) and DNA
lymerase activity may be identical was tested by
yering portions of sera from a patient with cir-
lating hepatitis B surface antigen (HBsAg), HBeAg,
ne particles, and DNA polymerase activity onto 30%
crose and centrifuging them at 230,000 x *g*. The
crose fractions contained HBsAg and HBeAg, but were
void of significant DNA polymerase activity; the
eAg and HBsAg were subsequently separated by affin-
y chromatography. Although HBeAg were not found
Dane-rich pellets that had been resuspended in
osphate-buffered saline, treatment of the pellets
th Tween 80 resulted in the appearance of detec-
ble HBeAg, as well as an increase in DNA polymer-
e activity. HBeAg was not detected in similarly
eated sera obtained from three HBsAg-positive pa-
ents that originally contained Dane particles,
t were HBeAg-negative and devoid of DNA polymerase
tivity. This may indicate defective HBeAg synthe-
s by the hepatocyte, resulting in the production
incomplete viral particles. If so, the presence
circulating HBeAg may represent the formation of
mplete virions and may indicate potential hepatitis
virus infectivity.

30 CORRELATIONS BETWEEN THE DETECTION OF e ANTIGEN OR ANTIBODY AND ELECTRON MICRO-
OPIC PATTERN OF HEPATITIS B SURFACE ANTIGEN (HBsAg)
SOCIATED PARTICLES IN THE SERUM OF HBsAg CARRIERS.

ng.) Trepo, C.; Bird, R. G.; Zuckerman, A. J.
avillon H, Hopital Edouard-Herriot, 69374 Lyon
dex 2, France). *J. Clin. Pathol.* 30(3):216-220;
77.

To investigate further the clinical significance of the e antigen/antibody system and its relation with hepatitis B surface antigen (HBsAg)-associated particles, the distribution of HBsAg associated particles, especially the presence of Dane particles, was studied by electron microscopy in coded sera of 68 chronic HBsAg carriers. The results were correlated with the detection of antigen (eAg) or antibody (eAb) and with clinical diagnosis. Sera from hemodialysis and chronic hepatitis patients showed a high prevalence of e antigenemia (9/13, 69.2% and 8/19, 42.1%, resp.) and Dane particles (11 and 16 resp., 84%). By contrast, out of 36 chronic asymptomatic carriers of HBsAg, 28 (77.7%) were positive for eAb, but only 1 (2.7%) had eAg. Dane particles were found in 13/36 (36.1%). A statistically significant correlation was observed between the detection of eAg and the presence of Dane particles (94.4%) in the serum. However, Dane particles were still observed in 10 of 28 (35.7%) anti-e positive sera. The data suggest that eAg may be linked to complete hepatitis B virions.

3431 A COMPARATIVE STUDY OF HEPATITIS B AND NON-B IN HOSPITALIZED ADULTS IN AN ENDEMIC AREA.

(Eng.) Krausz, Y.; Melamed, S.; Sandler, S. G.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Isr. J. Med. Sci.* 13(1):9-14; 1977.

The epidemiologic, clinical, and laboratory features of 40 adults with acute viral hepatitis B were compared with those of 40 adults with non-B hepatitis. The clinical course of hepatitis B tended to be more severe than that of non-B hepatitis. Fever was significantly more common in hepatitis B (80% of cases) than in non-B hepatitis. Hepatitis B was also associated with more extensive liver injury (i.e., mean SGOT=3,042 ± 353 mU/ml, mean hospital stay=14.4 ± 2.2 days) than with non-B hepatitis (mean SGOT=1,861 ± 273 mU/ml, hospital stay=11.3 ± 0.9 days). No significant differences were noted in mean values for alkaline phosphatase, albumin, globulin, and cholesterol or for prothrombin activity. There were no significant differences between hepatitis B and non-B with regard to possible acquisition of infection by contaminated materials during dental treatment, by needle injections, or by other modes of parenteral exposure, except for blood transfusion. The mean age of patients with hepatitis non-B was significantly lower (23.3 yr) than that of patients with hepatitis B (32.7 yr). Blood transfusion during the previous 6 months was significantly correlated with hepatitis B, being a probable etiologic factor in 30% of the cases; none of the non-B hepatitis patients had received a blood transfusion within the previous 6 months ($p<0.05$). Sixty-three percent of the patients with hepatitis B and 53% of the patients with non-B hepatitis presented during June-October. The clinical findings confirm the view that hepatitis B is characteristically more insidious in onset, more severe in clinical course, and more prolonged in duration than non-B hepatitis.

3432 NON-B HEPATITIS IN MELBOURNE: A SEROLOGICAL STUDY OF HEPATITIS A VIRUS INFECTION.

(Eng.) Gust, I. D.; Dienstag, J. L.; Purcell, R.

H.; Lucas, C. R. (Fairfield Hosp. Communicable Diseases, Melbourne 3078, Australia). *Br. Med. J.* 1(6055):193-195; 1977.

The value of immune adherence hemagglutination tests for antibody to hepatitis A virus in the diagnosis of non-B hepatitis was studied in 16 patients from six families in which two or more cases of hepatitis had occurred within 3 months, in 8 patients with hepatitis with no known source of infection, and in 2 parenteral drug abusers, both of whom had had two attacks of acute hepatitis. The diagnosis of hepatitis A was confirmed by seroconversions or significant rises in hepatitis A antibody titers in 14 patients in the first group, 7 in the second group, and 1 of the two attacks of each non-B hepatitis patient in group 3. The case reports of the four patients in whom attacks of hepatitis lacked serological confirmation are presented. In patients with acute hepatitis A, antibody detectable by immune adherence hemagglutination became detectable 3-4 weeks after the onset of symptoms and reached a peak about 5 weeks later. The results confirm that the detection of rising hepatitis A antibody titers by immune adherence hemagglutination is a reliable index of infection with hepatitis A virus. The presence of a high hepatitis A antibody titer during the first 2 weeks of illness, or its absence in sera collected 6 weeks or more after the onset of symptoms, makes a diagnosis of hepatitis A unlikely.

3433 A PROSPECTIVE STUDY OF ACUTE VIRAL HEPATITIS WITH PARTICULAR REFERENCE TO HEPATITIS A. (Eng.) Locarnini, S. A.; Gust, I. D.; Ferris, A. A; Stott, A. C.; Wong, M. L. (Alfred Hosp., Melbourne, Victoria, 3181, Australia). *Bull. WHO* 54(2): 199-206; 1976.

To investigate the relationship of hepatitis A antigen to viral hepatitis, a prospective study was carried out on 97 patients with suspected viral hepatitis, and 3 of their family contacts. Evidence of infection with hepatitis A virus was obtained by detecting hepatitis A antigen in stools, and/or antibody to it in sera, by immune electron microscopy. Infection with hepatitis B virus was determined by testing for hepatitis B surface antigen and antibody in serum, by solid phase radioimmunoassay. Sixteen patients had diseases other than viral hepatitis and two patients (child contacts) suffered no illness. There was clinical and/or biochemical evidence compatible with viral hepatitis in 82 patients, of whom 35 had confirmed hepatitis A and 31 had hepatitis B. In the remaining 16 patients, there was no evidence of infection with either hepatitis A or B virus. It is possible that some of these patients may have been infected with viral agents as yet unidentified.

3434 DEVELOPMENT OF CHRONIC LIVER DISEASE AFTER ACUTE NON-A, NON-B POST-TRANSFUSION HEPATITIS. ROLE OF γ-GLOBULIN PROPHYLAXIS IN ITS PREVENTION. (Eng.) Knodell, R. G.; Conrad, M. E.; Ishak, K. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *Gastroenterology* 72(5, Part 1): 902-909; 1977.

The occurrence of chronic liver disease after acute non-A, non-B post-transfusion hepatitis is documented, and the clinical course, risk factors, and hepatic lesions seen in 44 cases are characterized. Ten cases of chronic liver disease were identified in the 44 cases of acute non-A, non-B post-transfusion hepatitis. Age, sex, severity of acute illness, and prevalence of preoperative antibodies to known hepatitis-producing agents did not differ between the group whose hepatitis progressed to chronicity and the group whose hepatitis resolved. Less progression of acute hepatitis to chronic liver disease was seen in those patients receiving immune serum globulin preoperatively than in those receiving an albumin placebo ($p=0.009$). Only three patients had clinical symptoms of hepatitis at the time of liver biopsy, and elevations of liver enzymes and γ-globulin were mild. However, liver biopsy specimens in 8 of 10 patients showed chronic active hepatitis, and an additional biopsy specimen showed cirrhosis. Acute non-A, non-B post-transfusion hepatitis often progresses to chronic active hepatitis; preoperative γ-globulin prophylaxis significantly reduces this progression. Identification and characterization of this viral agent(s) will further aid in the prevention of this undesirable complication of blood transfusion.

3435 SIGNIFICANCE OF DETERMINATION OF THE ENZYMES AND ISOENZYMES ACTIVITY FOR DIAGNOSIS OF ACUTE NECROSIS OF THE LIVER (IN VIRAL HEPATITIS). (Rus.) Drobinsky, I. R.; Andriutsa, K. A.; Gabarets, E. P. (Kishinev Medical Inst., Kishinev, USSR). *Klin. Med. (Mosk.)* 54(11):39-44; 1976.

3436 PROGNOSTIC VALUE OF e ANTIGEN IN ACUTE HEPATITIS TYPE B [Abstract]. (Eng.) Acero, D.; Bruguera, M.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 14(5/6): 490; 1976.

3437 e ANTIGEN IN ACUTE HEPATITIS B [Abstract] (Eng.) Woolf, I. L.; Sheikh, N. E. L.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):487; 1976.

3438 e ANTIGEN IN LIVER DISEASE AND HEMODIALYSIS PATIENTS [Abstract]. (Eng.) Pedreira, J. D.; Esteban, R.; Guardia, J.; Hernandez-Sanchez, J. M.; Martinez-Vazquez, J. M.; Racardi, R (Dept. Internal Medicine, Universidad Autonoma, Barcelona, Spain). *Digestion* 14(5/6):539; 1976.

3439 CORRELATION OF THE e ANTIGEN-ANTIBODY SYSTEM WITH INTRAHEPATOCELLULAR HBeAg AN HBsAg IN HBsAg-POSITIVE ACUTE AND CHRONIC LIVER DISEASES AND HEALTHY HBsAg CARRIERS [Abstract]. (Eng.) Arnold, W.; Nielsen, J. O.; Hess, G.; Knolle, J.;

eyer zum Buschenfelde, K. H. (Second Dept. Internal
edicine, Johannes Gutenberg-Univ., Mainz, W.
ermany). *Digestion* 14(5/6):488; 1976.

40 GENERAL IMMUNITY AND THE COURSE OF HEPATITIS B IN HAEMODIALYSIS PATIENTS [Ab-
tract]. (Eng.) Houwen, B.; De Gast, G. C.; Nier-
eyer, P. (Dept. Internal Medicine, Univ. Groningen,
roningen, Netherlands). *Digestion* 14(5/6):520;
76.

41 IN VITRO STUDIES OF CELLULAR IMMUNE REACTIVITY TO HBsAg IN PATIENTS WITH VARIOUS
VER DISEASES [Abstract]. (Eng.) Aldershvile, J.;
etrichson, O.; Hardt, F.; Skinhoj, P. (Kommune-
spitalet, Copenhagen, Denmark). *Digestion* 14(5/6):
2; 1976.

42 IMMUNE RESPONSE TO HEPATITIS B VIRUS IN PATIENTS WITH PAPULAR ACRODERMATITIS OF
ILDHOOD (PAC) [Abstract]. (Eng.) Colombo, M.;
anotti, F.; Paronetto, F. (Dept. Medicine, Univ.
lan, Milan, Italy). *Digestion* 14(5/6):502; 1976.

43 THE LOCALISATION OF SURFACE AND CORE ANTIGEN IN THE LIVERS OF HEPATITIS B
TIGEN CARRIERS [Abstract]. (Eng.) Jones, D. M.;
pp, E. (Withington Hosp., Manchester, England).
gestion 14(5/6):489; 1976.

44 CHARACTERISTICS OF VIRAL HEPATITIS IN TROPICAL REGIONS. (Fre.) Limbos, P.
rins Albertlei 26, B-2600 Berchem, Belgium).
ta Gastroenterol. Belg. 39(9/10):328-333; 1976.

45 OCCURRENCE OF AUSTRALIA ANTIGEN IN MARTINIQUE. (Fre.) Constant-Desportes,
; Coulaud, J. P.; Payet, M. (Hopital Claude-
rnard, Faculte Xavier-Bichat, France). *Bull.*
c. Pathol. Exot. 69(3):282-288; 1976.

3446 HOUSEHOLD TRANSMISSION OF HEPATITIS B INFECTION [Abstract]. (Eng.) Chiaramonte, M.; Vecelli, C.; Naccarato, R. (Dept. Gastroenterology, Univ. Padova, Padova, Italy). *Digestion* 11(5/6):501; 1976.

3447 PART B. (Eng.) Gellatly, J. B. *In: Mouse Hepatic Neoplasia. Proceedings of a Workshop held at the H.T.S. Management Center, Lane End, High Wycombe Great Britain), 12-17 May 1974.* (New York: Elsevier Scientific Publishing Company): pp. 155-164; 1975.

3448 THE C_3, C_{3Att}, AND C_4 FRACTIONS OF COMPLEMENT IN ACUTE VIRAL HEPATITIS: PRELIMINARY RESULTS. (Ita.) Di Simone, A.; Russo Spena, A.; Riegler, G.; Gnarini, R. (I Facolta di Medicina e Chirurgia dell'Universita di Napoli, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(4):197-199; 1976.

3449 PERSISTENCE OF SUPRANORMAL PLASMA α-FP LEVELS IN SUBJECTS WITH PREVIOUS ACUTE HEPATITIS [Abstract]. (Eng.) Gaidano, G. P.; Berta, L.; Boccuzzi, G.; Angeli, A.; Molino, G. P. (Istituto di Medicina Interna, Universita degli Studi di Torino, Torino, Italy). *Digestion* 14(5/6): 513; 1976.

3450 STUDY OF PSEUDOURIDINE AND URIC ACID EXCRETION IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Lifshits, R. I.; Salomatin, V. V.; Efimenko, G. P. (Medical Sch., Chelyabinsk, USSR). *Vopr. Med. Khim.* 22(5):687-690; 1976.

See also, 2864, 2882, 3361, 3364, 3366, 3369, 3371, 3372, 3391, 3476.

LIVER AND BILIARY TRACT

Chronic Hepatitis

51 GENETIC FACTORS IN THE DEVELOPMENT OF CHRONIC ACTIVE HEPATITIS. (Eng.)
ndberg, J.; Lindholm, A.; Iwarson, S. (East
sp., Univ. Goteborg, Goteborg, Sweden). *Lancet*
8002):67-68; 1977.

e occurrence of triggering agents and the fre-
ency of autoantibodies were studied at the on-
t of symptoms in 41 chronic active hepatitis
AH) patients with histocompatibility antigens
A-B8 and B12 and in patients with other HLA types.
enty-five patients had HLA-B8 and/or B12. In 11 of these patients (44%), a possible triggering factor was present; 5 patients had histological and/or serological signs of viral hepatitis and 6 had a history of drug exposure. In contrast, in 14 of the 16 patients without HLA-B8 or HLA-B12 (88%), a possible triggering factor was shown to be associated with the onset of symptoms ($p<0.02$). Antinuclear antibodies (ANA) were found in 68%, and smooth muscle antibodies (SMA) in 52%, of the patients with HLA-B8/12; in patients with other HLA-types, the corresponding frequencies were 43% and 50%. ANA was present in 36% of the

HLA-B8/12 patients in whom CAH could have been triggered by external agents and in 93% of the HLA-B8/12 patients with cryptogenic CAH ($p<0.01$). No such difference was observed in the frequency of SMA (45% and 57%, resp.) in these two groups. The results suggest that there are at least two pathogenetically different types of CAH--one genetically determined type in which no external factor is involved and in which autoimmune phenomena are common, and another type triggered by environmental agents.

3452 CIRCULATING T AND B LYMPHOCYTES AND IMMUNOGLOBULIN CONTAINING CELLS IN THE LIVER IN CHRONIC ACTIVE LIVER DISEASE.

(Eng.) Aldershvile, J.; Dietrichson, O.; Hardt, F.; Nielsen, J. O. (Kommunehospitalet, DK-1399 Copenhagen K, Denmark). *Acta Pathol. Microbiol. Scand. [C]* 85(1):26-32; 1977.

The numbers of circulating thymus-derived and bone marrow-derived lymphocytes (T and B lymphocytes) were compared in 25 patients with biopsy-verified hepatitis B surface antigen (HBsAg)-positive and -negative chronic nonalcoholic liver disease. Fifteen patients had circulating HBsAg and/or anti-HBsAg, and 10 were without these markers. In both groups of patients, a significant decrease of T cells and a parallel significant increase in null cells was found, but no difference with respect to T and null cells in patients in the two groups was observed. Liver biopsies from five patients with and four without HBsAg and/or anti-HBsAg were studied for the presence of immunoglobulin-bearing cells. In three of five liver biopsies from the HBsAg- and/or antibody-positive patients and in two of the four liver biopsies from the HBsAg- and anti-HBsAg-negative patients, a heavy periportal infiltration with plasma cells was found. However, the number and classes of the immunoglobulin containing cells could not be correlated either to the histological evaluation of the stage of activity of the liver disease or to the markers for HB virus infection. The immunological findings in the two groups of patients with chronic liver disease seem to be of the same nature and are most likely a consequence of the liver disease.

3453 HLA DETERMINANTS IN CHRONIC ACTIVE LIVER DISEASE: POSSIBLE RELATION OF HLA-Dw3 TO PROGNOSIS.

(Eng.) Opelz, G.; Vogten, A. J. M.; Summerskill, W. H. J.; Schalm, S. W.; Terasaki, P. I. (Sch. Medicine, Univ. California, Los Angeles, CA 90024). *Tissue Antigens* 9(1):36-40; 1977.

Sixteen alleles of the histocompatibility antigen (HLA) locus A and 18 alleles of locus B, as well as the locus D antigen HLA-Dw3, were examined in 38 patients with severe chronic active liver disease (CALD). HLA typing was carried out by the standard microcytotoxicity technique, using 120 antisera. The frequency of HLA-Dw3 was significantly more frequent in the CALD patients (68%) than in 91 controls (24%, $p<0.0001$). Thirteen of 25 HLA-B8-negative patients gave typing reactions with Dw3 (52%), in contrast to 8 of 69 (12%) of the B8-negative controls ($p<0.001$). Sixteen of 26 patients with Dw3 had cirrhosis and/or were treatment failures, compared to only 3 of 12 patients without Dw3, and a longer duration of treatment with steroids (23 months) was required in those with Dw3 than in those without (13 months). The data show that the association of CALD with HLA-Dw3 is significantly stronger than the association with HLA-B8, implying genetic control of CALD by a locus in the proximity of the D locus of the HLA chromosome. It is suggested that genetic factors influence both susceptibility to CALD and response to treatment.

3454 PREDNISONE FOR CHRONIC ACTIVE LIVER DISEASE: PHARMACOKINETICS, INCLUDING CONVER SION TO PREDNISOLONE.

(Eng.) Schalm, S. W.; Summe kill, W. H. J.; Go, V. L. W. (Univ. Hosp., Dijkzigt Rotterdam, Netherlands). *Gastroenterology* 75(5, Pa 1):910-913; 1977.

To determine the effect of impaired liver function on conversion of prednisone to prednisolone, and tc investigate the relationship of this to responses to treatment with prednisone, serum prednisone and prednisolone were measured by radioimmunoassay afte the i.v. injection of prednisone (10 mg). The subjects included 10 healthy volunteers, 6 untreated patients with severe chronic active liver disease (CALD), 10 patients with prednisone-induced remiss of CALD, and 3 patients with CALD deteriorating despite treatment with prednisone. Prednisone disappearance was comparable in all groups, and substa tial values for serum prednisolone appeared in all groups within 0.3 hr. Minor differences between tl groups included lower than normal serum prednisolor in severe CALD and treatment failure, a higher percentage of nonprotein bound prednisolone in such pa tients, and an association between earlier treatme with prednisone and an increased disappearance rat of prednisolone. No major defect of prednisone metabolism occurs in CALD, and failure of this condition to respond to therapy with prednisone is caused by other factors.

3455 WHAT ABOUT CHRONIC ACTIVE HEPATITIS TODAY?

(Fre.) Geubel, A. P. (Cliniques Universitaires, Saint-Pierre, Brusselsestraat 69, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg* 39(9/10):318-327; 1976.

3456 THE VALUE OF ENZYME SCREENING TESTS IN A COMPLEX CONTROL PROGRAM FOR THE FIGHT AGAINST INFECTIOUS HEPATITIS.

(Ger.) Woltersdorf W. (Medizinisch-diagnostisches Zentrallaboratorium Muhlhausen, DDR-57 Muhlhausen/Thur., Langensalzaer Landstr. 1, E. Germany). *Dtsch. Gesundheitsw.* 31(48):2289-2291; 1976.

3457 THE SIGNIFICANCE OF SERUM IMMUNOGLOBULIN LEVELS IN THE PROGNOSIS OF CHRONIC HEPATITIS IN CHILDREN AND ADOLESCENTS. (Cze.) Lukes, J.; Lukesova, M. (305 99 Plzen, Marxova 13, Czechoslovakia). *Cesk. Pediatr.* 31(9):473-477; 1976.

See also, 3094, 3096, 3245, 3361, 3363, 3370, 3371, 3426, 3434, 3436, 3437, 3438, 3556.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3458 SEX-RELATED DIFFERENCES AMONG 100 PATIENTS WITH ALCOHOLIC LIVER DISEASE. (Eng.) Morgan, M. Y.; Sherlock, S. (Royal Free Hosp., London NW3 2QG, England). *Br. Med. J.* 1(6066):939-941; 1977.

The drinking patterns, presentation, clinical picture, and prognosis in 77 men and 23 women with a history of alcohol abuse and abnormal liver function test results were studied to determine whether sex differences are present in alcoholic liver disease. On presentation, the women were less likely to be suspected of alcohol abuse (38%) than the men (77%). Although the quantity of alcohol consumed and length of history of alcohol abuse were similar for men and women, the incidence of chronic advanced liver disease was higher among women (86%) than among men (65%). However, women were less likely than men to have developed primary liver cell cancer. Overall, the women had a higher incidence of other alcohol-related disorders and were less likely to stop abusing alcohol (9%) than were their male counterparts (29%). Women seem to be more susceptible to alcohol-related disease.

3459 ALCOHOLICS IN A PSYCHIATRIC ENVIRONMENT. CLINICAL, DIETETIC, BIOLOGICAL AND HISTOLOGICAL CHARACTERISTICS IN RELATION TO ALCOHOL CONSUMPTION. (Fre.) Clermont, R. J.; Pelletier, G.; Desrochers-Gauthier, S. (Hotel-Dieu de Montreal, 3840, Rue St-Urbain, Montreal, Quebec, H2W 1T8, Canada). *Rev. Fr. Gastroenterol.* (116):7-20; 1976.

Clinical, histological, and dietary profiles were obtained for 65 alcoholic patients admitted to a psychiatric hospital in a 1-yr period. Clinical symptoms were usually gastrointestinal (vomiting, abdominal pain, 45%; diarrhea, 68%); only 18% demonstrated delirium tremens. Radiology revealed gastrointestinal abnormalities in 72% of patients (gastritis, 34%; esophagitis, 23%; and ulcers, 39%). Sixty-three percent of patients had elevated alkaline phosphatase, 72% had abnormal SGOT, and 40% had elevated uric acid levels. Liver biopsies performed on 49 patients showed abnormal pathology (inflammation, fibrosis, steatoses, focal necrosis) in 95%. When blood studies were related to liver biopsies, the values of SGOT and alkaline phosphatase were more likely to be abnormal in patients with moderate rather than advanced cirrhosis. The dietary profiles obtained on 48 patients showed an average daily caloric intake of 2,815 calories (841-5,192), 44% of which was from alcohol and 9% from protein. The type of alcohol used had an effect on the degree of cirrhotic pathology; however, quantity of alcohol, proportion of alcohol in total calorie intake, and protein intake had no relation to severity of cirrhotic disease.

3460 SIGNIFICANCE OF γ-GLUTAMYL TRANSFERASE (GGT) ACTIVITY MEASUREMENTS IN ALCOHOL-INDUCED HEPATIC INJURY. (Eng.) Boone, D. J.; Tietz, N. W.; Weinstock, A. (Univ. Kentucky Medical Center, Lexington, KY 40502). *Ann. Clin. Lab. Sci.* 7(1):25-28; 1977.

Serum samples from 64 patients who were heavy, steady, or spree drinkers were analyzed for γ-glutamyl transferase (GGT), alanine transaminase, aspartate transaminase, lactate dehydrogenase, and alkaline phosphatase activities, and experimental evidence that the determination of GGT is useful in the assessment of alcohol-induced liver disease is reviewed. A fivefold increase in mean GGT activity was observed in 81% of the 30 patients with a history of heavy alcohol intake; 72% of 14 steady drinkers (<a fifth of whiskey or wine/day) had a mean GGT value of approximately twice that of normal individuals, but spree drinkers showed no elevation in GGT activity. The determination of GGT activity was the most sensitive indicator of the amount of alcohol consumed. During the course of treatment, GGT activity decreased, regardless of the extent of the initial alcohol abuse. The determination of serum GGT is useful in the assessment of alcohol-induced liver disease and in demonstrating to patients the toxic effects of drinking habits on the liver.

3461 LYMPHOCYTE CYTOTOXICITY FOR ISOLATED HEPATOCYTES IN ALCOHOLIC LIVER DISEASE. (Eng.) Cochrane, A. M. G.; Moussouros, A.; Portmann, B.; McFarlane, I. G.; Thomson, A. D.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5, England). *Gastroenterology* 72(5, Part 1):918-923; 1977.

To determine whether an autoimmune reaction to liver-specific proteins occurs in alcoholic liver disease, the cytotoxic effect of lymphocytes on isolated hepatocytes was determined in 27 alcoholic patients. Cytotoxicity was demonstrated in 15 of 17 patients with a histological diagnosis of alcoholic hepatitis, but in none of 10 with other forms of alcoholic liver disease (cirrhosis without hepatitis, fatty liver, and minimal inflammatory changes). The ability of a liver-specific membrane lipoprotein to block the reaction suggests that sensitization to this antigen is responsible for the cytotoxicity. The demonstration of cytotoxicity using thymus-derived (T) cell-depleted, but not bone marrow-derived (B) and null (K) cell-depleted, lymphocytes suggests an antibody-dependent cell-mediated reaction. There was a close correlation between cytotoxicity and the presence of alcoholic hyalin, liver cell necrosis, and piecemeal necrosis, but not with other histological features, immunoglobulins, autoantibodies, or standard liver function tests. The persistence of this autoimmune response, induced in some way by alcohol or one of its metabolites, may be important in the progression of acute alcoholic hepatitis to chronic liver disease.

3462 CHRONIC FIBRINOLYSIS IN ALCOHOLIC CIRRHOSIS: THERAPEUTIC TRIAL WITH HEPARIN. (Fre.)

Thuot, C.; Marleau, D.; Viallet, A. (Hopital Saint-Luc, 1058 rue Saint-Denis, Montreal, Quebec H2X 3J4, Canada). *Rev. Fr. Gastroenterol.* (115):25-30; 1976.

Low doses of heparin (200 U/kg/24 hr, continuous i.v. infusion) were administered to eight patients with alcoholic cirrhosis to determine whether the fibrinolytic activity without bleeding observed in chronic alcoholics with cirrhosis could be explained by disseminated intravascular coagulation. Fibrinolysis disappeared during heparin infusion in two of eight patients, but reappeared within 48 hr of the cessation of therapy. No cryofibrinogen or soluble complexes were found; fibrinogen levels were normalized; platelets, factors V and VIII, and prothrombin factors were not significantly changed. Hemostasis indicators and fibrinolytic activity were not modified in the other six patients, even though two were given higher doses of heparin (500 U/kg/24 hr). The results support the hypothesis that a low-grade disseminated intravascular coagulation is related to spontaneous fibrinolysis in chronic alcoholic cirrhotics.

3463 SCLEROSING HYALINE NECROSIS IN NONCIRRHOTIC CHRONIC ALCOHOLIC HEPATITIS. (Eng.)

Karasawa, T.; Chedid, A. (Univ. Cincinnati Sch. Medicine, Cincinnati, OH 45267). *Am. J. Clin. Pathol.* 66(5):802-809; 1976.

The clinical and morphological features in 18 chronic alcoholic patients with sclerosing hyalin necrosis in noncirrhotic livers were compared with those of 12 similar individuals with acute alcoholic hepatitis, but no centrilobular fibrosis. In cases with sclerosing hyalin necrosis, the most characteristic features were portal hypertension with very large, tender livers and unusually high GOT values; these were associated with centrilobular fibrosis and abundant alcoholi hyalin. Three of these patients died within 2 yr, an in two of these, early cirrhosis was found at autopsy. In the cases of acute alcoholic hepatitis, hepatomegal was the most conspicuous finding, and only a single patient died; death was unrelated to hepatic disease, th liver being unremarkable at autopsy. Patients who ha sclerosing hyalin necrosis tended to remain ill for significantly longer periods. These observations, in conjunction with evidence gathered from the literature suggest that sclerosing hyalin necrosis is an obligatory step in the natural evolution of alcoholic hepati disease, especially in cases that evolve into cirrhosi

3464 ABNORMAL PLASMA LIPOPROTEINS AND LECITHIN-CHOLESTEROL ACYLTRANSFERASE DEFICIENCY IN ALCOHOLIC LIVER DISEASE. (Eng.)

Sabesin, S. M.; Hawkins, H. L.; Kuiken, L.; Ragland, J. B. (Univ. Tennessee, Coll. Medicine, 951 Court Ave., Memphis, TN 38163). *Gastroenterology* 72(3):510-518; 1977.

Serial studies of plasma lipids and lipoproteins were performed in four patients with acute alcoholic liver disease characterized by a massive fatty liver and intrahepatic cholestasis. There were striking alterations in the plasma lipoprotein electrophoretic patterns characterized by the absence of α- and pre-β-lipoprotein bands and the presence of a single band of abnormal mobility. An extreme associated decrease in plasma lecithin-cholesterol acyltransferase activity resulted in greatly reduced levels of plasma cholesteryl esters and increased levels of unesterified cholesterol. In two patients, hypertriglyceridemia and hypercholesterolemia were present, the latter because of an increase in unesterified cholesterol. Lipoproteins were isolated from the plasma by sequential ultracentrifugation at the densities used for separation of normal very low density, low density, and high density lipoproteins; however, the patients' lipoproteins were different from normal in lipid composition and ultrastructure. All of the lipoprotein fractions were decreased in cholesteryl esters, and the major lipoprotein was a triglyceride-rich low density lipoprotein. Ultrastructural studies of the low and high density lipoprotein fractions revealed the presence of bilamellar vesicles and stacked discs. All changes in lipoprotein composition and ultrastructure gradually returned to normal with clinical improvement. These observations indicate that alcoholic liver injury is associated with profound alterations in lipoprotein composition and metabolism, and may be related, in part, to lecithin-cholesterol acyltransferase deficiency.

3465 FROM DRINKING TO CIRRHOSIS. (Fre.)

Thomas, M. (Hopital Saint-Antoine, 184, rue du Faubourg, Saint-Antoine, 75012 Paris, France). *Rev. Prat.* 26(51):3559-3568; 1976.

66 CLINICAL ASPECTS AND TREATMENT OF NON CIRRHOTIC ALCOHOLIC HEPATITIS. (Fre.)
aput, J. C.; Buffet, C.; Labayle, D. (Hopital
toine-Beclere, 157, rue de la Porte-de-Trivaux,
92141 Clamart, France). *Rev. Prat.* 26(51):3573-
80; 1976.

See also, 3051, 3094, 3363, 3374, 3376, 3392.

LIVER AND BILIARY TRACT

Cirrhosis

67 A DIAGNOSTIC TRIAD FOR PORTAL CIRRHOSIS. (Eng.) Goldberg, D. M.; Ellis, G.;
rd, A. M. (Hosp. Sick Children, 555 University Ave.,
ronto, Ontario M5G 1X8, Canada). *Clin. Chim.*
ta 72(3):379-382; 1976.

triad of clinical abnormalities commonly en-
untered in portal cirrhosis is described. The
sults of various tests in 49 patients with por-
l cirrhosis were compared with those from 19
tients with cholelithiasis, 18 patients with
flammatory disease of the gallbladder or bile
cts, 19 patients with carcinoma of the head of
e pancreas, 10 patients with bile duct car-
noma, 11 patients with chronic active hepatitis,
patients with viral hepatitis, 13 patients with
imary biliary cirrhosis, 32 patients with hepa-
c metastases, and 5 patients with postnecrotic
rrhosis. Abnormal serum aminotransferase act-
ities, with dominance of aspartate aminotrans-
rase over alanine aminotransferase activity,
l elevated serum adenosine deaminase activity
l IgA concentration, were commonly encountered
ong the patients with portal cirrhosis. The
ll triad was present in 31 of the 49 cases
3%). As isolated abnormalities, these features
re not uncommon in patients with other diseases
the liver and biliary tree, but the full triad
s found in only 11 of 163 such cases (6.8%).
e presence of this triad in a patient with un-
plained hepatomegaly is indicative of portal
rrhosis.

8 SPECIFIC FEATURES OF THE CLINICAL COURSE OF BILIARY CIRRHOSIS OF THE LIVER. (Rus.)
inov, A. S.; Yartseva, H. M.; Kryukova, L. V.;
chak, S. N. (Central Scientific-Res. Inst.
troenterology, Moscow, USSR). *Ter. Arkh.*
9):12-20; 1976.

e clinical, morphological, immunological, and
ctional features of primary biliary cirrhosis
re studied in 90 patients with cholestatic hepa-
is (CH) and primary biliary cirrhosis (PBC).
all patients, diagnosis was confirmed at morpho-
ical examination (laparoscopy, laparotomy); all
10 patients were subjected to biopsy. Transforma-
n of CH into PBC was observed in 15 patients subjec-
l to long-term follow-up. Two stages of CH, which
ceeded the PBC, could be recognized. The patients
h stage I (anicteric) CH complained of pruritus, xanthelasma, and arthralgia; they had elevated serum cholesterol, bile acids, transaminases, and alkaline phosphatase. Hepatitis symptoms were more pronounced in the patients with stage II of CH; all patients had enlargement of the liver. The patients with stages II and III (PBC) showed enlargement of lymph nodes and changes in the mucosa of the stomach and duodenum; 12 patients had duodenitis, 15 erosive or atrophic gastritis, and 15 duodenal ulcer; 15 patients had pulmonary syndrome. Forty-five patients with PBC had endocrine disturbances, 5 patients had cyst of the appendages, and 8 had fibromyoma of the uterus.

3469 A CONTROLLED TRIAL OF D-PENICILLAMINE THERAPY IN PRIMARY BILIARY CIRRHOSIS. (Eng.)
Jain, S.; Scheuer, P. J.; Samourian, S.; McGee, J. O.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Lancet* 1(8016):831-834; 1977.

The value of D-penicillamine (900 mg, daily) therapy in primary biliary cirrhosis was studied in a randomized controlled trial. Nineteen patients received D-penicillamine, and 13 received placebo. The two groups were similar in age, duration of illness, liver function tests, and liver histology. Before entry into the trial the liver-copper concentration was raised in 25 of the 27 patients in whom it was measured. After 3 months, patients taking D-penicillamine showed a significant reduction in serum-aspartate-transaminase concentrations, compared with the placebo group, and this reduction seemed to be sustained. In the four patients on D-penicillamine for a year, a second liver biopsy showed that mean liver-copper concentration fell from 310 ± 128 to 84 ± 36 μg/g dry liver, compared with a reduction from 511 ± 169 to 454 ± 128 in the seven patients in the placebo group in whom serial liver-copper measurements were available. Liver histology demonstrated a comparative improvement in cholestasis in patients on penicillamine, but the degree of inflammation, necrosis, and the histological stage of disease remained similar in both groups. The drug was discontinued because of side-effects (i.e., nausea and vomiting, urticaria, proteinuria) in 5 of the 19 patients in the D-penicillamine group. One patient who developed erythromyeloid aplasia with septicemia recovered after antibiotics and WBC infusions. D-penicillamine seems to be a promising treatment for patients with primary biliary cirrhosis. It may produce its effect by reducing liver copper concentration.

3470 THE ARTERIAL BLOOD SUPPLY TO THE LIVER IN CIRRHOSIS. (Eng.) Baer, J. W. (St. Luke's Hosp. Center, Amsterdam Ave. at 114th St., New York, NY 10025). *Gastrointest. Radiol.* 1(3):209-213; 1976.

A retrospective study of celiac and superior mesenteric arteriograms in 21 cirrhotic and 27 noncirrhotic patients was carried out to establish the incidence and significance of collateral circulation to the liver from the superior mesenteric artery. Nine cirrhotic patients had collateral arterial flow. In four of these patients, celiac angiography demonstrated forward flow in the gastroduodenal artery, but superior mesenteric arteriography showed some retrograde flow through the gastroduodenal artery to the hepatic artery distal to the origin of the gastroduodenal artery. In the remaining five patients, a celiac injection demonstrated no filling of the gastroduodenal artery; a concave filling defect was noted in the inferior aspect of the main hepatic artery at the site of origin of the gastroduodenal artery. The superior mesenteric arteriogram showed filling of the hepatic arteries distal to the gastroduodenal artery origin throughout the gastroduodenal arcade, and there was no visualization of the main hepatic artery. Two patients with the former type of collateral flow and three patients with the latter type had evidence of centrifugal portal flow, as measured by the presence of collateral venous flow. The degree of collateral arterial flow was also related to the presence of hyperbilirubinemia and the presence of a markedly enlarged spleen with increased splenic blood flow. Of the 27 noncirrhotic patients, 6 had collateral arterial flow to the liver from the superior mesenteric artery. The greatest degree of collateral arterial flow was associated with celiac stenosis in four of the six patients.

3471 A STUDY OF THROMBOCYTIC (MICROCIRCULATORY) HEMOSTASIS IN LIVER CIRRHOSIS. (Rus.) Makarevich, Ya. A.; Kosterova, V. V.; Podobedov, G. M.; Shamshev, V. M. (Astrakhan Medical Inst., Astrakhan, USSR). *Sov. Med.* (8):69-74; 1976.

Thrombocytic hemostasis was studied in 65 liver cirrhosis patients. Thrombocyte adhesion and aggregation were analyzed in the peripheral blood; in 19 patients, the indices were determined simultaneously in the peripheral and portal blood. The average adhesion of the peripheral thrombocytes in the patients with cirrhosis was lower than in healthy controls (28.4% and 33.7%, resp.); adhesion was more pronounced in the patients with postnecrotic cirrhosis (30.6%) than in patients with portal cirrhosis (27.2%). The average adhesion in the portal blood was significantly higher (38.2%) than in peripheral blood. Disaggregation of thrombocyte aggregates was significantly accelerated in the peripheral blood (46.3%, compared to 33.6% in controls) and reduced in the portal blood; the difference between the disaggregation in the peripheral and portal blood was most pronounced in 19 patients with hemorrhagic syndrome (81.0% and 33.9%, resp.).

3472 IN VIVO LABELING OF PLATELETS WITH ^{75}Se--SELENOMETHIONINE IN PATIENTS WITH HEPATIC CIRRHOSIS AND THROMBOCYTOPENIA. (Eng.) Mayer, M.; Herrmann, I.; Kempgens, U.; Queisser, W. (First Dept. Internal Medicine, Univ. Heidelberg, Heidelberg, W. Germany). *Thromb. Haemostas.* 37(1):47-52; 1977.

The platelets of nine patients with liver cirrhosis and thrombocytopenia were labeled *in vivo* with ^{75}Se-selenomethionine (^{75}Se-M) to evaluate the kinetics of platelet maturation in hepatic cirrhosis. Folic acid and vitamin B_{12} deficiency was excluded by pretreatment of the patients with these agents. The platelet maturation time (time between the injection of the isotope and maximum radioactivity of separated blood platelets) was shortened to 7.7 ± 1.1 days, compared to 9.1 ± 1.4 days in controls. A disturbance in megakaryocyte maturation and/or platelet release from the bone marrow is suggested in hepatic cirrhosis.

3473 THROMBIN TIME PROLONGATION IN CIRRHOSIS IN RELATION TO ENHANCED FIBRINOGEN DEGRADATION. (Eng.) Lipinski, B.; Gurewich, V.; Lipinska, I. (Tufts Univ. Sch. Medicine, Boston, MA 02135). *Thromb. Res.* 10(1):185-187; 1977.

The hypothesis that the prolonged thrombin time in the plasma of patients with liver disease is related to an abnormal fibrinogen level was investigated using 3.5% sodium dodecyl sulfate-polyacrylamide gel electrophoresis of the plasma and sera of healthy subjects and cirrhotic patients. Fibrinogen in normal plasma was found to be composed of a high molecular weight (HMW) and a lower molecular weight (LMW) fraction in a proportion of about 2:1. In an occasional healthy subject, a very low concentration of a still lower molecular weight band (LMW^1) was seen. In the cirrhotic patients, most, and in two cases all, of their fibrinogen migrated in the region of the LMW or LMW^1 bands. This may account for the prolonged thrombin time in these patients.

3474 LOWER ESOPHAGEAL SPHINCTER PRESSURE IN CIRRHOTIC MEN WITH ASCITES: BEFORE AND AFTER DIURESIS. (Eng.) Van Thiel, D. H.; Stremple, J. F. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 1):842-844; 1977.

Lower esophageal sphincter pressure (LESP) was measured in 10 biopsy-proved cirrhotics with esophageal varices and tense ascites before and after diuresis to evaluate the possibility that ascites play a role in the development of variceal bleeding. Basal LESP was 30.9 ± 1.7 mm Hg before and 22.7 ± 1.3 mm Hg ($p<0.01$) after diuresis, which resulted in a mean 12-kg weight loss. LESP responses to abdominal compression were also evaluated. The change in LESP in response to a standard degree of abdominal compreson (intragastric pressure increased 4 mm Hg) was eater in the presence of ascites (8.5 ± 0.4 mm Hg) an in its absence (6.3 ± 0.4 mm Hg, $p<0.01$). Basal stric pH and fasting plasma gastrin concentrations d not differ during the two testing periods. sed on these data and on the rarity with which rrhotic patients with ascites complain of heart- rn, it is concluded that reflux esophagitis caused failure of the lower esophageal sphincter to re- in competent is unlikely to be a significant etio- gical factor in the development of variceal bleed- g.

75 CORRELATION BETWEEN HEPATIC MORPHOLOGY AND IMMUNOGLOBULINS AND ANTIBODIES TO cherichia coli IN CIRRHOSIS.

(Eng.) Prytz, H.; orneboe, M.; Christoffersen, P.; Poulsen, H.; skov, F. (Bispebjerg Hosp., Copenhagen, Denmark). t 18(1):28-32; 1977.

e hypothesis that immunoglobulin and antibody vels in the serum of cirrhotic patients are re- ted to the degree of certain morphological changes the liver was tested. In 50 patients with cirrho- s, 28 alcoholics, and 22 nonalcoholics, the degree architectural destruction, the degree of fibrosis, e degree of fatty infiltration, and the degree of ctivity" were compared with immunoglobulins G, A, d M and *Escherichia coli* O antibody levels. The mparison was carried out within each etiological oup. Identical relationships were found in both oups. Patients with completely destroyed lobular chitecture had higher levels of *E. coli* O anti- dies than patients with partly destroyed archi- cture. Patients with severe fibrosis had higher A and *E. coli* O antibody levels than patients with derate or slight fibrosis. Patients with moderate d severe steatosis and patients with no or slight eatosis had the same immunoglobulin and *E. coli* antibody levels. Patients with active cirrhosis d higher IgG levels than patients with inactive rrhosis. When architectural destruction and brosis were combined, significantly higher IgG, A, IgM, and *E. coli* antibodies were found in the oup with the most severe changes. These findings pport the hypothesis that immunoglobulin and anti- dy levels are related to the degree of morpholog- al changes in the liver, i.e., destruction of lob- ar architecture, fibrosis, and "activity."

76 A NEW CASE OF MONOCLONAL IgA KAPPA COLD AGGLUTININ WITH ANTI-Pr_1d SPECIFICITY IN PATIENT WITH PERSISTENT HB ANTIGEN CIRRHOSIS.

ng.) Tonthat, H.; Rochant, H.; Henry, A. oorrier, M.; Dreyfus, B. (INSERM U-91, Hopital ri Mondor, F-94010 Creteil, France). *Vox Sang.* (6):464-468; 1976.

ew case of cold agglutinin disease in a 65-yr- d woman, who had a 7-yr history of Raynaud's enomenon without hemolysis and a persistent patitis B antigen cirrhosis, is reported. The tient's serum reacted with adult and cord cells a titer of 128. The cold agglutinin was a mono- onal IgA antibody that reacted at 4 C to a titer of 256. Treatment with 2-mercaptoethanol (0.1 M) reduced the titer to 8. Eluates, obtained after incubating the patient's serum with rat and dog cells, still reacted with human adult, cord, rat, and dog cells, but failed to react when these cells were treated with papain or neuraminidase, demonstrating characteristic Pr_1d specificity. The unique finding that this and three other IgA cold agglutinins described in the literature are all directed against the Pr_1 antigen indicates a strict correlation between antibody class and specificity.

3477 DIAGNOSTIC SIGNIFICANCE OF STUDIES OF PORPHYRINS IN DISEASES OF THE LIVER.

(Rus.) Makarevich, Ya. A.; Smporina, A. P. (Astrakhan Medical Inst., Astrakhan, USSR). *Ter. Arkh.* 48(9): 61-66; 1976.

The diagnostic value of porphyrin tests was studied in 60 patients with cirrhosis and 41 patients with porphyria cutanea tarda (urocoproporphyria). Of 41 patients with porphyria cutanea tarda, 23 had cirrhosis (13 patients had initial stage of active, portal cirrhosis, and 10 patients had stage II cirrhosis with mixed hepatocellular and vascular insufficiency), 10 had chronic hepatitis, and 8 did not have morphological changes in the liver. The patients with cirrhosis had elevated level of coproporphyrin in the urine (206 ± 20 µg/g, compared to 37.2 ± 4.7 µg/g in controls) and nonaltered levels of uroporphyrin (33 ± 4 µg/g, compared to 27.7 ± 4.2 µg/g in controls). The patients with porphyria cutanea tarda were found to have elevated level of coproporphyrin (378 ± 56 µg/g) and markedly elevated levels of uroporphyrin (2, 453 ± 279 µg/g). The coproporphyrin:uroporphyrin ratio was 6.2 in the patients with cirrhosis with symptomatic copro- porphyria and 0.1 in the patients with porphyria cutanea tarda.

3478 TOTAL AND FREE THYROXINE IN PATIENTS WITH LIVER CIRRHOSIS.

(Eng.) Gembicki, M.; Dzieciuchowicz, S.; Sowinski, J.; Makowska, K.; Klincewicz, H. (Klinika Endokrynologii, ul. Przybyszewskiego 49, 60-355 Poznan, Poland). *Pol. Med. Sci. Hist. Bull.* 15/4(2):213-216; 1976.

The total thyroxine serum concentration, the tri-iodothyronine-binding coefficient (T_3BC), free thyroxine (DFT_4), free thyroxine index (FT_4I), and absolute value of free thyroxine ($ADFT_4$) were determined in 11 patients with compensated liver cirrhosis, 10 patients with uncompensated cirrhosis, and 41 healthy controls, in an attempt to evaluate thyroid function in cirrhotic patients. In the uncompensated cirrhotic patients, the mean T_3BC (0.103 ± 0.047), FT_4I (0.76 ± 0.32), DFT_4 (0.046 ± 0.025%), and $ADFT_4$ (3.1 ng%) values were significantly elevated in comparison with those of the controls ($p<0.05$ for T_3BC, $ADFT_4$, and FT_4I; $p<0.01$ for DFT_4). The authors conclude that these changes are due to disturbances in the binding capacity of the proteins that bind thyroid hormones and also to an impaired degradation of these hormones in the liver.

3479 INTESTINAL ABSORPTION OF 25-HYDROXYVITAMIN D AND OSTEOMALACIA IN PRIMARY BILIARY CIRRHOSIS.

(Eng.) Compston, J. E.; Thompson, R. P. H. (St. Thomas' Hosp., London SE1, England). *Lancet* 1(8014):721-724; 1977.

Intestinal absorption of vitamin D was investigated in 11 patients with primary biliary cirrhosis to study the etiology of the osteomalacia sometimes seen in these patients. Bone biopsies revealed that four patients had severe osteomalacia, all of whom had been taking p.o. cholestyramine for over 2 yr; one patient without osteomalacia had been treated with cholestyramine for 3 months prior to the study. The mean plasma 25-hydroxyvitamin D (25-OHD) concentrations before and after a p.o. dose of 25-OHD$_3$ (10 μg/kg) were significantly lower in patients (7.1, 42.0, 45.1, and 30.2 ng/ml at 0, 4, 8, and 24 hr, resp.) than in 30 healthy controls (17.7, 124.6, 135.6, and 93.8 ng/ml at 0, 4, 8, and 24 hr, resp.). The mean plasma 25-OHD concentrations at 4, 8, and 24 hr were lower in the patients with osteomalacia than in the seven patients without, and at 4 and 8 hr, these differences were significant ($p<0.025$). The patient without osteomalacia who was taking cholestyramine had the lowest 25-OHD concentrations in the normal group. The mean serum calcium was 2.32 ± 0.05 mM in the patients with osteomalacia and 2.54 ± 0.07 mM in the patients without ($p<0.05$). The mean 24-hr urinary calcium excretion was 0.6 ± 0.5 mmol in the patients with osteomalacia and 3.8 ± 0.6 mmol in the patients without ($p<0.01$), and the mean serum alkaline phosphatase was 134.8 ± 20.8 King-Armstrong (KA) U/dl in the former patients and 53.4 ± 9.8 KAU in the latter patients ($p<0.01$). It is suggested that the absorption of 25-OHD undergoing enterohepatic circulation and of dietary vitamin D is reduced in patients with primary biliary cirrhosis. 25-OHD absorption is further decreased by cholestyramine, and the development of osteomalacia is hastened.

3480 REDUCED BINDING OF ADDED ZINC IN SERUM OF PATIENTS WITH DECOMPENSATED HEPATIC CIRRHOSIS.

(Eng.) Giroux, E.; Schechter, P. J.; Schoun, J.; Sjoerdsma, A. (Centre de Recherche Merrell International, 16 rue d'Ankara, 67000 Strasbourg, France). *Eur. J. Clin. Invest.* 7(1):71-73; 1977.

The possibility that the albumin of cirrhotic patients and of normal subjects differs in its affinity for zinc was examined in 13 decompensated cirrhotic patients and 12 healthy subjects. Binding of zinc to macromolecules when added to serum was measured by ultrafiltration. In 12 of the 13 patients, the total serum zinc concentration (497 ± 34 μg/l) was more than two standard deviations below the mean of the group of 12 normal subjects (924 ± 36 μg/l, $p<0.001$). All patients had significantly lower serum albumin and serum albumin-bound zinc concentrations (29 ± 2 μg/l and 312 ± 27 μg/l, resp.) than the controls (46 ± 1 μg/l, $p<0.001$ and 753 ± 31 μg/l, $p<0.001$, resp.). At a final ratio of 0.6 mol zinc/mol albumin, zinc dissociable by glycine was significantly greater in diluted serum from the patients than in normal serum samples similarly prepared ($p<0.001$). Low serum zinc concentrations, often observed in patients with alcoholic cirrhosis, may be related in part to a reduced affinity of plasma albumi for exchangeable zinc.

3481 AN OPTIMAL DIURETIC REGIMEN FOR CIRRHOTIC ASCITES. A CONTROLLED TRIAL EVALUATING SAFETY AND EFFICACY OF SPIRONOLACTONE AND FUROSEMIDE.

(Eng.) Fuller, R. K.; Khambatta, P. B.; Gobezie, G. C. (Cleveland Veterans Admin. Hosp., 10701 East Blvd., Cleveland, OH 44106). *JAMA* 237(10):972-975; 1977.

The safety and efficacy of a regimen combining diuretic therapy with strict sodium restriction in the treatment of cirrhotic ascites were evaluated in a controlled trial. Eighteen male patients without life-threatening complications of cirrhosis and without hyponatremia were studied. In the first part of the study (9 patients), it was demonstrated that a 6-day diuretic regimen (50 mg spironolactone, b.i.d.; 40 mg furosemide daily during the last 3 days) with dietary sodium restriction of 10 mEq/day is safe and more effective than sodium restriction alone. During the respective 6-day treatment period and subsequent 6-day period in which the patients received placebo while on a sodium-restricted diet, seven of the nine subjects lost more weight when they received diuretics than when they received placebo; the average weight loss on diuretics was 3.2 kg greater than with sodium restriction alone ($p<0.01$). The abdominal girth of seven of the nine subjects decreased an average of 3.1 cm more when they were treated with diuretics ($p<0.05$). The subjects excreted 42 mEq more sodium daily when they had received diuretics ($p<0.01$). In the second study, 6 days of diuretic therapy were compared with 9 days in nine patients. One patient was excluded due to the development of asterixis and mental confusion after 4 days of diuretic therapy. Among the eight remaining patients, therapy was safely extended to 9 days, with mobilization of significantly more fluid. Careful selection of subjects, use of diuretics in modest dosages for brief periods of time, and daily monitoring of subjects are important for the safe treatment of cirrhotic ascites with diuretics and rigid dietary sodium restriction.

3482 CHOLANGIOCARCINOMA ASSOCIATED WITH BILIARY CIRRHOSIS DUE TO CONGENITAL BILIARY ATRESIA.

(Eng.) Kulkarni, P. B.; Beatty, E. C., Jr. (Children's Mercy Hosp., 24th and Gillham Rd., Kansas City, MO 64108). *Am. J. Dis. Child.* 131(4):442-444; 1977.

The case report of an 11-yr-old girl with cholangiocellular carcinoma in association with biliary cirrhosis due to congenital biliary atresia is presented. An exploratory laparotomy and an operative cholangiogram at 3 months of age had confirmed the diagnosis of extrahepatic biliary atresia. A liver biopsy specimen taken at 6 months of age showed biliary cirrhosis. The subsequent clinical course was characterized by persistent moderate jaundice, anemia, malnutrition, rickets, pathologic fractures, and recurrent gastrointestinal bleeding. The presence of cholangiocellular carcinoma of the liver with advanced biliary cirrhosis was estab-

shed at an exploratory laparotomy 1 week before
ath. A review of the literature suggests that
e association between cirrhosis and primary liver
rcinoma in childhood may be more than coincidental.

83 UPPER GASTROINTESTINAL HAEMORRHAGE IN
HEPATIC CIRRHOSIS: CAUSES AND RELATION
HEPATIC FAILURE AND STRESS. (Eng.) Franco,
; Deporte, A.; Durandy, Y.; Bismuth, H.
nserm, Hopital Paul Brousse, 14 avenue Paul-
illant Couturier, 94800 Villejuif, France).
ncet 1(8005):218-220; 1977.

e sites of upper gastrointestinal bleeding
ong 85 cirrhotic patients were compared with
e degree of hepatic failure and the severity
associated diseases to determine why some
rrhotic patients bleed from varices and
hers from acute ulcers. Among the 84 act-
ely bleeding sources, esophagogastric var-
es (52.4%) and acute mucosal ulcers (40.5%)
re the most frequent causes of bleeding. In
e 56 patients with moderate or no hepatic
ilure, esophagogastric varices (62.5%), acute
ug-associated ulcers (21.4%), and chronic pep-
c ulcers (10.8%) were the main causes of bleed-
g. In the 28 patients with severe hepatic
ilure, acute drug-independent ulcers were the
mmonest lesions (60.7%), while ruptured esophago-
stric varices (32.1%) and acute drug-associated
cers (7.2%) were less frequent. Ruptured eso-
agogastric varices were significantly more
equent in patients with no or moderate liver
ilure (79.5%) than in patients with severe
ver failure (20.5%, $p<0.01$). Acute drug-
sociated ulcers were more frequent in the former
oup (85.7%) than in the latter (14.3%), al-
ough this difference was not significant.
ute drug-independent ulcers were significantly
re common in patients with severe liver failure
5%) than in the other group (15%, $p<0.001$).
ress factors were present in 7.1% of the 56
tients in whom hepatic failure was absent or
derate and in 43% of the 28 in whom it was
vere ($p<0.01$). In the severe hepatic failure
oup, stress was present in only 11% of the
tients in whom bleeding was due to esophago-
stric varices, but stress was present in 64%
the patients in whom bleeding resulted from
ug-independent ulcers ($p<0.001$). This study
monstrates the association between the severity
hepatic failure and the pathogenesis of
morrhage and the role of stress as a cause of
eeding ulcers in the presence of severe
patic disease.

3484 SOME INDICES OF NONSPECIFIC IMMUNITY IN LIVER CIRRHOSIS AND THEIR CLINICAL ASSESSMENT. (Rus.) Afanasiev, S. S.; Afanasieva, K. A.; Chirkin, Yu. D.; Ablaeva, T. D.; Podobedov, G. M. (Astrakhan' Medical Inst., Astrakhan', USSR). *Sov. Med.* (5):103-107; 1975.

3485 PROSPECTIVE STUDY OF QUANTITATIVE VARIATIONS IN THE PLASMA LEVELS OF ALPHA-FETOPROTEIN IN LIVER CIRRHOSIS. (Fre.) Delmont, J.; Schenowitz, G.; Masseyeff, R. (C.H.U. de Nice, avenue Reine-Victoria, F 06000 Nice, France). *Biol. Gastroenterol. (Paris)* 9:337-338; 1976.

3486 ASSESSMENT OF THE RISK OF THERAPEUTIC PORTACAVAL SHUNT IN CIRRHOSIS BY MULTIFACTORIAL ANALYSIS. (Fre.) Gauthier, A.; Cros, R. C.; Assadourian, R.; Di Costanzo, J. (Hopital Sainte-Marguerite, 270, boulevard Sainte-Marguerita, F 13274 Marseille Cedex 2, France). *Biol. Gastroenterol. (Paris)* 9:340; 1976.

3487 INITIAL EXPERIENCES IN THE TREATMENT OF CIRRHOTIC ASCITES BY CONTINUOUS ULTRAFILTRATION AND REINFUSION OF PROTEIN CONCENTRATE. (Ser.) Davcev, P.; Bidikov, V.; Vanovski, B. (Medical Faculty, Skopje, Yugoslavia). *Med. Pregl.* 28(7/8):285-290; 1975.

3488 DIGESTIVE TRACT HEMORRHAGE IN CIRRHOTIC PATIENTS AND STRESS. (Fre.) Franco, D.; Durandy, Y.; Deporte, A.; Bismuth, H. (Hopital Paul-Brousse, 14, avenue Paul-Vaillant-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9:339; 1976.

3489 EFFECT OF AN ESTROGEN ON THE PLASMA CONCENTRATION OF RENIN SUBSTRATE IN CIRRHOSIS. (Fre.) Degos, F.; Descatoire, V.; Menard, J.; Benhamou, J. P. (INSERM U-24, Hopital Beaujon, F 92110 Clichy, France). *Biol. Gastroenterol. (Paris)* 9:337; 1976.

See also, 3043, 3046, 3094, 3096, 3098, 3361, 3363, 3371, 3387, 3392, 3399, 3434, 3465.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

90 COMPARATIVE EVALUATION OF TRI-IODIZED CONTRAST AGENTS FOR CHOLECYSTOCHOLANGIOGRAPHY.
us.) Popova, Z. P.; Ushakov. V. L.; Sviridov, N.
(Moscow Roentgenoradiological Inst., Dept. Roent-
nodiagnosis, Moscow, USSR). *Sov. Med.* (12):68-
; 1976.

The diagnostic value of cholecystocholangiography with various tri-iodized contrasting agents was studied in 704 patients. Oral cholecystography with cholevid, iopagnost, cystobil, osbil, solu-biloptin, and cholebrin was performed in 277 patients, and 477 patients underwent i.v. cholegraphy with bilignost, biligraphin, adipiodon, endocystobil, ultrabil, and biligran. Gallbladder visualization was observed in 57.9% of the patients undergoing i.v. cholegraphy and in 87% of the patients undergoing oral cholecystography; visualization of bile ducts was observed in 89.3% and 52% of the patients, resp. Side-effects (fever, nausea, and vomiting) were more common after i.v. cholegraphy (130/477) than after oral cholecystography (31/277).

3491 THE BIOCHEMICAL PREREQUISITES FOR PREVENTING PATHOGENIC LYSOLECITHIN ACTIVITY IN THE HUMAN GALLBLADDER. (Eng.)

Sjodahl, R.; Tagesson, C. (Dept. Surgery, Linkoping Univ., Linkoping, Sweden). *Scand. J. Gastroenterol.* 11(7):661-665; 1976

Experiments were carried out to study whether lysolecithin is affected by components from its implied target tissue, i.e., the gallbladder epithelium. When human gallbladder epithelium was incubated with lysolecithin (25-500 M/1.4 mg protein), lysolecithin was degraded, and stoichiometrically equivalent amounts of free fatty acids were formed. The maximum rate of degradation was obtained at pH 7.0 and at 200 µM lysolecithin. The rate of lysolecithin degradation increased with increased amounts of gallbladder epithelial cell components. Heating the epithelial components at 70 C for 10 min completely inhibited the degradation of lysolecithin. The results suggest the presence of a heat labile lysophospholipase (phospholipase B) activity in the human gallbladder epithelium. This activity may operate to protect gallbladder epithelium against potentially pathogenic lysolecithin activity. Its presence in the gallbladder epithelium indicates a local anti-inflammatory mechanism and supports the hypothesis that lysolecithin mediates cholecystitis.

3492 AMYLASE CREATININE CLEARANCE RATIO AFTER BILIARY SURGERY. (Eng.)

Donaldson, L. A.; McIntosh, W.; Joffe, S. N. (Stobhill Hosp., Glasgow, Scotland). *Gut* 18(1):16-18; 1977.

The value of the amylase:creatinine clearance ratio (ACCR) in the early recognition of postoperative acute pancreatitis was assessed in 25 patients undergoing elective cholecystectomy, and this ratio was compared with the serum amylase ratio. With the exception of one patient, the serum amylase level remained within normal limits postoperatively. The mean ACCR before operation was 2.6%, which significantly increased to a mean of 4.9% 24 hr after the operation ($p<0.005$). Five of seven patients in whom the ACCR exceeded 5.5% (mean 8.7%) had undergone common bile duct exploration during the cholecystectomy; this was in comparison with only 2 of the 17 patients with cholecystectomy in whom the ACCR was raised ($p<0.05$). By the ninth postoperative day, the ACCR had returned to normal in all patients. The mean serum amylase level significantly fell from a preoperative mean of 173 IU/1 to 140 IU/1 24 hr after operation ($p<0.01$). At the time of discharge, the mean serum amylase level was 214 IU/1. The ACCR appears to be a more sensitive index of pancreatic disruption secondary to biliary surgery than the serum amylase level.

3493 DIURNAL VARIATIONS IN THE pH OF PATHOLOGICAL GALLBLADDER BILE. (Eng.)

Sutor, D. J.; Wilkie, L. I. (Dept. Chemistry, Univ. Coll., London, England). *Gut* 17(12):971-974; 1976.

The pH of gallbladder and common duct bile from patients undergoing cholecystectomy was measured. The bile was collected and kept anaerobically at 37 C, and the pH was measured at 37 C, generally within 30-60 min after the bile was taken from the patient. Only data from patients having functioning or poorly functioning (but not nonfunctioning) gallbladders were included. The pH of common duct bile was always greater than that of the corresponding gallbladder bile, and this did not vary diurnally. The mean pH of gallbladder bile from patients undergoin operation at different times during the day showed a diurnal variation, the bile becoming more acidic with time. The mean pH at 830 was significantly higher than at 1030, 1400, and 1530 ($p<0.002$, <0.01, and <0.002, resp.). The mean pH at 1530 was significantly lower than at 1030 and at 1400 ($p<0.05$ and <0.04, resp.). The results also suggest a diurnal variation in the particular process responsible for the change in pH of gallbladder bile. Patients operated on in the afternoon fasted for several hou less than patients undergoing surgery in the mornin but bile for the two afternoon groups was significantly more acidic than that for the two morning groups, except for patients operated on at 1030 and 1400, when the mean pH values were comparable. However, the morning group probably slept or rested muc of the time because the fast was overnight, whereas the afternoon group was more physically active. Th acidification of bile is, therefore, apparently retarded during sleep, inactivity, or lying down.

3494 CHOLEDOCHAL CYSTS: A CLINICAL AND RADIOLOGICAL EVALUATION OF 21 CASES.

(Eng.) Bass, E. M.; Cremin, B. J. (Groote Schuur Hosp., Observatory, Cape Town, South Africa). *Pediatr. Radiol.* 5(2):81-85; 1976.

Experience with 21 cases of choledochal cyst is described, and 4 illustrative case reports are presented. Seventeen patients were female, and only three patients were over the age of 16 yr. Sixteen patients had concentric dilatation of the common bile duct; two patients had an eccentric diverticulum; two had multiple cystic dilatations of intrahepatic biliary radicles (Caroli's disease); and the remaining patient had dilatation of the distal end of the common bile duct or choledochocoele. Jaundice occurred in 17 patients, abdominal pain in 10, and a palpable abdominal mass in 11. The classical triad of all these features occurred in only five patients. Gallstones were found in two patients. All but two patients were treated surgically. Both unoperated cases had concentric ysts, and both patients, aged 5 and 6 months, esp., died. The first patient was found at utopsy to have had an atretic distal common ile duct, and the second patient died from evere gastroenteritis. Awareness of the roentenographic diagnostic possibilities of this conition, which are reviewed, will enable early iagnosis and surgical treatment.

495 CURRENT CONCEPTS OF THE PATHOGENESIS AND TREATMENT OF CHOLESTEROL GALLSTONES.

(Fre.) eaudoin, M.; Shaffer, E. A. (Laboratoire de Physioogie Digestive, Hopital Notre-Dame, 1560 Est, rue herbrooke, Montreal H2L 4K8, Canada). *Rev. Fr. Gasroenterol.* (116):29-42; 1976.

he various types of gallstones, factors predisposing owards formation of cholesterol gallstones (the most ommon type found in Western civilizations), and the onsurgical treatment of cholesterol bile calculi are eviewed. Research is in progress on several pharaceutical methods of decreasing the lithogenicity of ile and inducing calculi dissolution. Chenodeoxyholic acid appears to be the most promising agent at resent, although phenobarbital, heparin, and taurodiydrofusidate are also active in preventing or disolving cholesterol gallstones.

496 DIETARY CHOLESTEROL AFFECTS CHENODEOXYCHOLIC ACID ACTION ON BILIARY LIPIDS.

Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; ove, H.; Schoenfield, L. J. (Cedars-Sinai Medical enter, 8700 Beverly Boulevard, Los Angeles, CA 0048). *Gastroenterology* 72(5, Part 1):927-931; 977.

he effect of high and low dietary cholesterol on he chenodeoxycholic acid (CDC)-induced decrease of iliary saturation and activity of hepatic hydroxyethylglutaryl coenzyme A reductase (HMG-CoAR) was tudied. Seventy-two hamsters in six groups were ed one of three diets for 1 month: 0.8 mg of holesterol per g of food, 2.4 mg of cholesterol er g, or cholesterol-free. On each diet, hamsters eceived no CDC or CDC (30 mg/kg/day). The animals ere killed, biliary lipids were determined, and the ctivity of hepatic HMG-CoAR was assayed. CDC adinistration decreased the saturation index (SI, <0.01) in hamsters on the high cholesterol and stanard diets, but not on the cholesterol-free diet. he SI in CDC-treated hamsters on the high choleserol (0.78 ± 0.03) and cholesterol-free (0.68 ± .02) diets was greater ($p<0.02$) than in CDC-treated amsters on the standard diet (0.48 ± 0.03). CDC ecreased ($p<0.01$) HMG-CoA reductase activity on ach diet. In comparison to HMG-CoAR activity 190 ± 7.6 pmol/mg/min) in CDC-treated hamsters on he standard diet, the activity in CDC-treated hamters on the high cholesterol diet (176 ± 5.8 pmol/g/min) was decreased ($p<0.05$), whereas the activity n the cholesterol-free diet (495 ± 11.5 pmol/mg/min) as greater ($p<0.01$). It is concluded that: dietary holesterol is necessary for optimum CDC inhibition f HMG-CoAR, that high cholesterol and cholesterolree diets prevent maximum CDC decrease of the biliary saturation index, and that dietary cholesterol alterations may be one cause of the failure of CDC dissolution of gallstones.

3497 SPEED OF CHANGE IN BILIARY LIPIDS AND BILE ACIDS WITH CHENODEOXYCHOLIC ACID--IS INTERMITTENT THERAPY FEASIBLE?

(Eng.) Iser, J. H.; Murphy, G. M.; Dowling, R. H. (Guy's Hosp., London Bridge, SE1 England). *Gut* 18(1):7-15; 1977.

To see whether intermittent chenodeoxycholic acid (CDCA) therapy is a potential alternative to continuous treatment for gallstone dissolution, the speed of change in bile lipid composition was studied after starting and stopping CDCA therapy. The relationship between bile lipid composition and the proportions of the bile acids was also examined. Bile-rich duodenal fluid was collected twice in the first week and at approximately weekly intervals for 4-6 weeks, from six gallstone patients starting 13-15 mg CDCA/kg/day and from another group of six patients whose treatment was stopped after gallstone dissolution. After starting treatment, the mean biliary cholesterol saturation index decreased from 1.49 ± 0.17 to 0.92 ± 0.13 at 3 weeks and to 0.88 ± 0.10 at 4 weeks, by which time bile lipid composition had become relatively constant. In patients whose treatment was stopped, bile reverted to its supersaturated state within 1 week, changing from an on-treatment mean saturation index of 0.74 ± 0.10 to 1.15 ± 0.15 in 6-8 days after withdrawing CDCA. The proportion of conjugated CDCA in the biliary bile acids increased from 27.9 ± 2.5% to 60.5 ± 4.2% within 4 days and to 80.7 ± 6.2% by 4 weeks after starting CDCA. When treatment was stopped, the proportion of CDCA reverted to pretreatment levels by 2-3 weeks. The saturation index was significantly related ($p<0.001$) to the percent of conjugated CDCA present, such that when the proportion of CDCA exceeded 70%, bile was almost invariably unsaturated. Since the mean time taken for bile to become unsaturated was not shorter than the time taken for bile to revert to its supersaturated state, it seems that intermittent treatment would not be adequate to maintain an unsaturated bile and is, therefore, unlikely to be as effective as continuous treatment in dissolving gallstones.

3498 CHANGES IN BILE ACID METABOLISM DURING TREATMENT WITH CHENODEOXYCHOLIC ACID. STUDIES ON THE IMPORTANCE OF URSODEOXYCHOLIC ACID FOR GALLSTONE DISSOLUTION.

(Ger.) Fromm, H.; Erbler, H. C.; Eschler, A.; Schmidt, F. W. (Montefiore Hosp., Pittsburgh, PA 15213). *Klin. Wochenschr.* 54(23):1125-1131; 1976.

Significant changes in biliary composition of bile acid were established in nine patients with radiolucent gallstones under long-term chenodeoxycholic acid (CDC) therapy. The CDC concentration increased from 47.5 ± 4.21 to 79.2 ± 6.37 SEM%, ursodeoxycholic acid (UDC) increased from 2.7 ± 1.15 to 13.4 ± 6.47%, unsulfated lithocholic acid increased from 0.7 ± 0.22 to 2.7 ± 0.41%, and bile acid pool expanded by 130% (average). The highest increase in pool size was found in patients with the highest UDC concentration in the bile. Gallstone dissolution was observed in the five patients with the highest UDC concentration, indicating the cholelitholytic effect *in vivo* of UDC. The adequacy of the therapeutic CDC dose of 20 mg/kg/day was demonstrated by its 94% absorption (average) by patients.

3499 EFFECT OF VARYING DOSES OF CHENODEOXYCHOLIC ACID ON BILE LIPID AND BILIARY BILE ACID COMPOSITION IN GALLSTONE PATIENTS: A DOSE-RESPONSE STUDY.

(Eng.) Thistle, J. L.; Hofmann, A. F.; Yu, P. Y. S.; Ott, B. (Mayo Clinic, Rochester, MN 55901). *Am. J. Dig. Dis.* 22(1):1-6; 1977.

Dose-response information was obtained from 13 patients with radiolucent gallstones who received a formulation of chenodeoxycholic acid (chenic acid; 0, 250, 500, and 700 mg/day) with complete bioavailability for randomized 6-week periods. The proportion of chenic acid in biliary bile acids increased in direct relation to dose. Lithocholic acid also increased, but ursodeoxycholic acid showed no significant change. Bile saturation decreased with increasing dose, but response was variable and achieved significance only at 750 mg/day. Cholesterol saturation was negatively correlated with the proportion of chenic acid in biliary bile acids. When biliary bile acids contained greater than 70% chenic acid (and ursodeoxycholic acid), bile became unsaturated. The data suggest that a dose of at least 10-15 mg/kg may be necessary to obtain desaturation in many gallstone patients.

3500 TREATMENT OF PATIENTS WITH GALLSTONES WITH CHENODEOXYCHOLIC ACID.

(Ger.) Leuschner, U.; Reber, E.; Erb, W. (Zentrum der Inneren Medizin der Universitat, Theodor-Stern-Kai 7, 6000 Frankfurt/Main, W. Germany). *Dtsch. Med. Wochenschr.* 102(5): 156-160; 1977.

The results of the treatment of 24 patients with gallstones with chenodeoxycholic acid (CH) are reported. CH was given as 250 mg capsules 4 times daily. Six patients dropped out of the study for various reasons at the start of treatment. The remaining 19 patients were treated from less than 3 months to over 1 yr. Follow-up of 12 of 19 patients showed that 6 had complete stone dissolution, and 1 patient had almost complete stone dissolution. Stone size remained unchanged in five patients. Surgery was required in two patients with biliary duct concrements. One patient showed no change despite 17 months of treatment. Side-effects developing during CH therapy in all 24 patients included diarrhea (14 patients), epigastric pressure (6), colic (4), increase in transaminase levels (5), raised alkaline phosphatase (2), raised gamma-GT (2), and pruritus (1).

3501 THE INFLUENCE OF VAGAL-NERVE AND SERUM-LIPIDS ON THE DEVELOPMENT OF BILE-STONES.

(Eng.) Hartung, H.; Schaefer, H. (Dept. Surgery, Univ. Freiburg, Freiburg, W. Germany). *Chir. Gastroenterol.* 10(2):221-223; 1976.

Thirty women with cholelithiasis were examined to determine whether they had any impairment of vagus nerve function and/or a disturbance in serum lipid levels. There were no significant differences in mean preoperative serum lipid values between these patients and healthy women. After cholecystectomy, the mean arterial levels of total lipids, phosphatides, free fatty acids, triglycerides, and cholesterol esters were significantly lower than before the operation ($p<0.01$, 0.02, 0.05, 0.05, and 0.01, resp.); the levels of total lipids, phosphatides, cholesterol, and cholesterol esters were also significantly lower in the venous blood. The percentual fraction of phosphatides and triglycerides were lower by 3% and 5%, resp., in the patients with cholelithiasis than in healthy women. The total gastric acid secretion was lower in patients with gallstones than in healthy subjects. After insulin stimulation, the increase in acid concentration in the gallstone patients took place 15 min later than in healthy subjects. The acid concentration curve in the patients was not as steep as in the healthy subjects, and the concentration dropped 15 min earlier. These results imply that the vagus nerve function may be impaired in patients with cholelithiasis.

3502 PRIMARY COMMON DUCT STONES.

(Eng.) Saharia, P. C.; Zuidema, G.; Cameron, J. L. (Johns Hopkins Medical Inst., Baltimore, MD). *Ann. Surg* 185(5):598-604; 1977.

In an effort to identify patients with primary common duct stones, cases of patients undergoing common duct exploration over a 24-yr period were reviewed; the clinical presentation, operative findings, surgical treatment, and long-term follow-up results are reported. Of 758 patients, 30 were identified as having primary common duct stones. Criter for diagnosis included at least a 2-yr symptom-free interval following cholecystectomy; soft, light brown stones or sludge present in the common duct; and the absence of a long cystic duct remnant or a biliary stricture from the previous surgery. The average age of the 30 patients was 66 yr. The interval between cholecystectomy and the diagnosis o primary common duct stones average 12 yr. Acute cholangitis was a frequent mode of presentation (16 patients), and 21 patients presented with right upper quadrant pain. At the time of surgery, the bile duct was often dilated out of proportion to the serum bilirubin level. Ampullary stenosis was present in only one patient. Twenty-six of the 30 patients had only stone extraction and insertion of a T-tube for treatment of their primary common duct stones. Twenty-two of the 26 were followed for an average of 4 yr and 9 months with no evidence of recurrent stones in 82% (18/22). Four patients developed recurrent primary common duct stones 1, 5, 5 and 7 yr later. It is concluded that most patients with primary common duct stones do well after stone extraction alone.

503 BILIARY BACTERIA AND HEPATIC HISTOPATHOLOGIC CHANGES IN GALLSTONE DISEASE. (Eng.)
linn, W. R.; Olson, D. F.; Oyasu, R.; Beal, J. M.
Northwestern Univ. Medical Sch., Chicago, IL).
nn. Surg. 185(5):593-597; 1977.

he frequency and severity of liver damage in 126 pa-
ients with gallstone disease and the role of bac-
eria in the development of these changes were as-
essed. Needle biopsy of the liver demonstrated
cute inflammation of portal triads in 19 patients,
finding not present in 27 control patients. Acute
nflammation occurred more often in patients with
cute cholecystitis (5/8) and choledocholithiasis
6/6) than in chronic cholecystitis (16/56). Cul-
ures of the biliary tract or liver were positive
n 23 of 64 patients. The frequency of positive
ile cultures increased with the severity of the
iliary tract disease. Five of six positive liver
ultures were from patients with acute cholecystitis
r choledocholithiasis. The data suggest that im-
airment of bile flow is responsible for the acute
epatic inflammatory changes.

504 ULTRASOUND AND JAUNDICE. (Eng.) Vicary,
F. R.; Cusick, G.; Shirley, I. M.; Black-
ell, R. J. (Univ. Coll. Hosp., London, England).
ut 18(2):161-164; 1977.

ltrasound was used in 26 jaundiced patients to dif-
erentiate between extrahepatic biliary obstruction
nd other causes of jaundice. Eighteen patients
ere scanned with a conventional B-scanner, and
ight were scanned with a grey-scale machine. Sat-
sfactory scanning was not possible in two patients
or technical reasons. It was possible to differen-
iate correctly between extrahepatic obstruction and
ther causes in 23 of the remaining 24 patients.
xtrahepatic jaundice was diagnosed in 9 of 10 pa-
ients. Stones were diagnosed in five patients,
lthough they were correctly diagnosed as causing
bstruction in only three of the five. The use of
ltrasonic techniques in the jaundiced patient of-
ers a high degree of accuracy to the clinician and
ittle or no discomfort to the patient.

505 EXTRAHEPATIC BILIARY TRACT OBSTRUCTION SECONDARY TO A HEPATOMA-CONTAINING
LOOD CLOT IN THE COMMON BILE DUCT. (Eng.)
rand, S. N.; Brandt, L. J.; Sprayregan, S.;
renner, S.; Bernstein, L. H. (Montefiore Hosp., 111
. 210th St., Bronx, NY 10467). *Am. J. Dig. Dis.*
1(10):905-909; 1976.

The case of a 76-yr-old man with a hepatoma who
resented with obstructive jaundice secondary to
ntraductal obstruction by a blood clot contain-
ng tumor cells is described. The patient pre-
sented with anorexia, weight loss, jaundice,
ruritus, dark urine, and acholic stool. Se-
lective celiac arteriography showed a localized
area of neovascularity in the right lobe of the
liver. A ^{99m}Tc liver scan revealed two discrete
filling defects in the right lobe, one of which
corresponded to the area of neovascularity demonstrated by arteriography. Intraoperative cholangiography showed reflux into dilated right and left hepatic ducts. A 4-cm partially organized blood clot filled the common bile duct lumen. The head of the pancreas, stomach, and colon were normal, and there was no evidence of metastatic disease to the regional lymph nodes or the omentum. A cholecystectomy and a choledochoduodenostomy were performed. Malignant epithelial cells consistent with hepatoma were found within the blood clot. A subsequent prostate biopsy revealed infiltrating adenocarcinoma. The patient has remained clinically well on weekly 5-fluorouracil therapy, although the liver remains enlarged and the alkaline phosphatase level remains elevated at 184 IU. The angiographic finding of a hypervascular lesion with hemobilia is presumptive evidence for a hepatoma, as hemobilia has not been reported with metastatic disease to the liver.

3506 SPONTANEOUS PERFORATION OF THE EXTRAHEPATIC BILE DUCTS IN INFANCY. (Eng.)
Hartong, J. M. (William Beaumont Army Medical Center, El Paso, TX 79920) *Am. Surg.* 42(10):795-800; 1976

A case of spontaneous perforation of the bile duct occurring in a 4-week-old girl is presented, and the literature concerning this entity is briefly reviewed. The child was hospitalized with scleral icterus, dark urine, and white stools. An upper gastrointestinal series revealed displacement of the stomach by a mass in the upper right abdomen. Exploratory celiotomy revealed a large bile pseudocyst anterolateral to the liver, communicating with a smaller bile pseudocyst at the junction of the cystic duct with the common duct. The cystic duct was totally avulsed from the common duct. A cholecystectomy was performed, and the perforation in the common duct was closed. A literature review reveals that other infants with bile duct perforation have a similar history. Recovery is to be expected in all patients in whom the bile is sterile.

3507 CONTRIBUTION TO THE STUDY OF "PORCELAIN GALLBLADDER." (Ita.) Costantini, R.; Zanaboni, M. (Divisione Chirurgica, Ospedale Generale Provinciale "Galmarini," Tradate, Italy). *Minerva Med.* 66(80):4242-4247; 1975.

A very rare case of gallbladder calcification ("porcelain gallbladder;" "vicarious gallbladder") is reported in a 54-yr-old woman hospitalized with a diagnosis of ulcerated duodenitis. The radiography of the gastrointestinal tract followed by cholecystography showed intense calcification in the gallbladder, and was diagnosed as lithiasic cholecystopathy. The cholecystotomy revealed very thickened (2-3 mm) and hard gallbladder walls, which were clearly calcified and extremely resistant to scalpel penetration. The cavity contained five calculi covered by a thin calcareous shell. Only the neck of the gallbladder--also thickened--showed no calcification, but ended in a blocked fundus towards the completely occluded cystic duct. The histological examination showed almost complete modification of all structures. The gallbladder walls were formed by dense connective tissue, with collagenous fibers showing deposits of calcium salts. The mucosa was almost absent and was replaced by deposits of cholesterol. This is the case of "porcelain gallbladder" from a population of 2,000 cholecystectomies, and only about 60 cases were reported between 1797 and 1966. The pathogenesis of "porcelain gallbladder" depends on concurrent mechanical (occlusion of the cystic duct) and inflammatory factors, the slow evolution of which may lead to the deposition of calcium salts. The symptoms are those of chronic cholecystopathy, and cholecystectomy is the only possible treatment.

3508 SENILE COMMON BILE DUCT: RADIOLOGICAL STUDY. (Fre.) Djian, A.; Paraf, A.; Benoit, A.; Svirchevsky, I. (Service de Radiologie, C.H.U. de Bobigny 93000 Paris, France). *Sem. Hop. Paris* 52(35): 1917-1920; 1976.

An attempt was made to correlate the diameter of the common bile duct (CBD) with the age and disease of patients. A radiological study of 117 patients revealed no difference in the frequency and density of opacification or morphology of the CBD, regardless of age (less than 30 to 90 yr). Of the 117 patients, 15 had common bile duct disease, 12 had hepatic diseases, and 39 had other related diseases. In these 66 patients, the mean corrected diameter of the CBD of patients less than 30 yr of age was 2.7 ± 0.8 mm, whereas the eldest patients (89-90+ yr) had a diameter of 7.0 ± 1.5 mm. It is concluded that the real diameter of the CBD increases 1 mm/10 yr of age. Similarly, it was also shown that the diameter of the hepatic canal also increases with age.

3509 THE EFFECT OF CHOLESTYRAMINE ON THE DYE EXCRETION OF THE LIVER [Abstract]. (Eng.) Pieragnoli, E.; Gallerini, L. (Hosp. Greve, Greve, Italy). *Digestion* 14(5/6):540-541; 1976.

3510 EFFECT OF CHOLOSAS, MAGNESIUM SULFATE AND SORBITOL ON THE MOTOR FUNCTION OF THE GALLBLADDER IN CHILDREN. (Rus.) Baklanova, V. F.; Antimonii, R. G. (Central Inst. Postgraduate Training of Physicians, Moscow, USSR). *Pediatriia* (3):50-51; 1976.

3511 INDICATIONS AND CONTRAINDICATIONS OF ENDOSCOPIC CHOLANGIOPANCREATOGRAPHY. (Fre.) Giroux, Y.; Archambault, A.; Farley, A. (Hopital Maisonneuve-Rosemont, 5415, boulevard de l'Assomption, Montreal HIT 2M4, Canada). *Rev. Fr. Gastroenterol.* (121):11-13; 1976.

3512 RADIOLOGIC LACUNA OF THE SECOND DUODENUM (PSEUDO-AMPULLOMA) DUE TO AMPULLARY CALCULUS AND DISTENSION OF THE LOWER COMMON BILE DUCT. USE OF DUODENOSCOPY AND BILIOPANCREATIC CATHETERIZATION. (Fre.) Debray, Ch.; Gouerou, H.; Edelmann, G.; Bellin, A.; Mendez, J. (Hopital Bichat, 170, boulevard Ney, 75877 Paris Cedex 18, France). *Sem. Hop. Paris* 52(34):1843-1846; 1976.

3513 CALCULI OF THE COMMON BILE DUCT AND THE INTRAHEPATIC BILIARY PATHWAYS, AND CANCER OF THE LOWER COMMON BILE DUCT. (Fre.) Chatelin, C. L.; Fissore, O.; Campora, J. L. (Centre Hospitalier Princesse Grace, avenue Pasteur, Monaco). *Sem. Hop. Paris* 52(34):1859-1862; 1976.

3514 A QUANTITATIVE ULTRASTRUCTURAL STUDY OF HEPATOCYTES AFTER CHENODEOXYCHOLIC ACID THERAPY IN CHOLESTEROL CHOLELITHIASIS [Abstract]. (Eng.) Jezequel, A. M.; Koch, M.; Capurso, L.; Freddara, U.; Lorenzini, L.; Orlandi, F. (Cell Pharmacology and Digestive Diseases Units, Univ. Ancona, Ancona, Italy). *Digestion* 14(5/6):476; 1976.

3515 ANOMALIES OF GALLBLADDER MUCOSA CELL KINETICS IN PATIENTS WITH CHOLELITHIASIS. (Fre.) Putz, P.; Willems, G. (Service de Chirurgie, Universite Libre de Bruxelles, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9:348; 1976.

3516 POSTHEPARIN CLEARANCE AND BLOCKAGE EFFECT OF PROTAMINE ON SERUM LP-X IN CHOLESTASIS [Abstract]. (Eng.) Rubies-Prat, J.; Ras, M. R.; Frison, J. C.; Masdeu, S.; Bacardi, R. (Dept. Internal Medicine, Ciudad Sanitaria de la Seguridad Social, Barcelona, Spain). *Digestion* 14(5/6):480; 1976.

3517 PHENOBARBITAL TREATMENT OF INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS. CONTROLLED STUDY IN 30 PATIENTS. (Fre.) Metreau, J. M.; Lecompte, Y.; Arondel, J.; Dhumeaux, D. (Hopital Henri-Mondor, F 94010 Creteil, France). *Biol. Gastroenterol. (Paris)* 9:344-345; 1976.

3518 ULTRASTRUCTURAL ASPECTS OF THE LIVER IN THE CHOLESTASIS OF THE PREGNANCY [Abstract]. (Eng.) Gasbarrini, G. B.; Zulli, P.; Bonvicini, F.; Corazza, G. R.; Bernardi, M.; Piattelli, L. (Inst. Medical Pathology and Obstetrics, Univ. Chieti, Chieti, Italy). *Digestion* 14(5/6):516; 1976.

519 PLASMA DISAPPEARANCE AND CONJUGATION OF ^{14}C-CHOLIC ACID IN PATIENTS WITH
BSTRUCTIVE JAUNDICE [Abstract]. (Eng.) Horak,
.; Knoflach, P.; Schuster, E.; Kemenesi, W.; Grab-
er, G. (Ordinariat fur Gastroenterologie, Univer-
itat Wien, Vienna, Austria). *Digestion* 14(5/6):
82-483; 1976.

520 CHRONIC JAUNDICE ASSOCIATED WITH DISTURBANCES IN HEPATIC UPTAKE AND STORAGE
UNCTIONS. (Fre.) Okolicsanyi, L.; Cortelazzo,
.; Orlando, R.; Ortolani, C.; Dal Brun, G.;
accarato, R. (Istituto Clinica Medica 1°, Università di Padova, Padova, Italy). *Biol. Gastroenterol. (Paris)* 9:345; 1976.

See also, 2751, 2898, 3044, 3047, 3048, 3049, 3095, 3101, 3102, 3106, 3115, 3228, 3306, 3344, 3362, 3363, 3368, 3379, 3380, 3383, 3425, 3482, 3568, 3570.

GENERAL

521 CLINICAL STUDY OF GASTROINTESTINAL COMPLICATIONS ASSOCIATED WITH CLINDAMYCIN
HERAPY. (Eng.) Swartzberg, J. E.; Maresca, R. M.;
emington, J. S. (Palo Alto Medical Res. Foundation,
60 Bryant St., Palo Alto, CA 94301). *J. Infect.
is.* 135(Suppl.):S99-S103; 1977.

he incidence of and factors associated with diar-
hea were evaluated in 1,000 patients receiving
lindamycin. Diarrhea occurred in 6.6% of the
atients. Diarrhea occurred nearly twice as often
n patients over 20 yr of age than in younger
atients ($p<0.01$). Diarrhea occurred in females
n 74.2% of the total cases. The incidence of
iarrhea was higher in patients who received the
rug p.o. (7.0%) than in those who received it
arenterally (2.2%, $p<0.05$). There was no corre-
ation between dose of drug or duration of therapy
nd diarrhea. Diarrhea began within 48 hr of the
tart of clindamycin therapy in 52.3% of the patients
nd within 5 days of therapy in 75.3%. Nineteen
atients developed diarrhea after they had stopped
eceiving the antibiotic. The duration of diarrhea
aried considerably, with a mean of 11.4 days
nd a range of 1-120 days. The benign nature of
he diarrhea in this patient population is note-
orthy.

522 GASTROINTESTINAL SIDE EFFECTS OF CLINDAMYCIN AND AMPICILLIN THERAPY. (Eng.)
usk, R. H.; Fekety, F. R., Jr.; Silva, J., Jr.;
odendorfer, T.; Devine, B. J.; Kawanishi, H.;
orff, L.; *et al.* (Univ. Michigan Medical Center,
nn Arbor, MI 48109). *J. Infect. Dis.* 135(Suppl.):
111-S119; 1977.

ospitalized patients who received clindamycin or
mpicillin were evaluated for gastrointestinal
ide-effects for up to 6 weeks after therapy was
iscontinued. Of 104 patients receiving clindamycin,
1 (29.8%) developed diarrhea, and 2 (1.9%) de-
eloped pseudomembranous colitis (PMC). Of 138
atients receiving ampicillin, 24 (17.3%) developed
iarrhea, and 1 (0.7%) developed PMC. Diarrhea
ersisted for 3 or more days in 13 (12.5%) patients
eceiving clindamycin and in 7 (5.1%) of those receiving ampicillin. The tendency to develop diarrhea was positively correlated with serious illness, abdominal or pelvic sepsis, and total dosage of clindamycin. Examination of stools from a patient with PMC that was associated with clindamycin therapy showed a decrease in the number of anaerobic bacteria over the numbers found in normal controls. Patients who did not develop diarrhea also had fewer anaerobic bacteria and coliform organisms. Lymphocytes from the patient with PMC were hyporeactive to phytohemagglutinin and hyperreactive to clindamycin. The results indicate that the symptoms of diarrhea are more frequent and more severe with clindamycin than with ampicillin.

3523 DIARRHEA ASSOCIATED WITH CLINDAMYCIN AND AMPICILLIN THERAPY: PRELIMINARY RESULTS OF A COOPERATIVE STUDY. (Eng.) Gurwith, M. J.; Rabin, H. R.; Love, K.; *et al.* (Health Sciences Center, 700 William Ave., Winnipeg, Manitoba R3E 0Z3, Canada). *J. Infect. Dis.* 135(Suppl.):S104-S110; 1977.

Patients treated with clindamycin were monitored for the development of diarrhea and colitis in a cooperative study at three hospitals. Ampicillin-treated patients were matched with clindamycin-treated patients. Diarrhea occurred in 62 (18%) of 343 clindamycin-treated patients, compared with 16 (5%) of 315 ampicillin-treated patients ($p<0.001$). The rate of diarrhea associated with clindamycin therapy ranged from 10% to 23% among the three hospitals, compared with 0 to 10% for ampicillin therapy. The only identified risk factor in the development of diarrhea was increased age; clindamycin-associated diarrhea occurred in 18 (46%) of 39 patients 60 yr old or older. No correlation was observed between the risk of diarrhea and the duration of treatment, total dosage of drug, route of administration, or type of underlying disease. Pseudomembranous colitis was diagnosed in 7 (2%) of 343 patients treated with clindamycin and in 1 (0.3%) of 315 patients treated with ampicillin. The data suggest that diarrhea occurs more frequently in patients treated with clindamycin than in those treated with ampicillin.

GENERAL

3524 LABORATORY CONFIRMATION OF AN OUTBREAK OF Clostridium perfringens FOOD POISONING. (Eng.) Schiemann, D. A. (Ontario Ministry Health, Public Health Lab., Box 9000 Terminal A, Toronto, Ontario M5W 1R5, Canada). *Health Lab. Sci.* 14(1): 35-38; 1977.

A food poisoning outbreak provided an opportunity to evaluate previously suggested criteria for *Clostridium perfringens* food poisoning. Eleven persons (44-73 yr old) ate the suspect meal and reported symptoms of gastroenteritis 13-13.5 hr later. The symptoms included abdominal cramps and diarrhea; one patient also reported vomiting, and two described general weakness. *C. perfringens* food poisoning was confirmed by the following criteria: the *C. perfringens* count in the suspect food, chicken pie, was at least 10^5/g; the median fecal *C. perfringens* spore count in convalescing patients exceeded 10^6/g; an identical serotype (PS63) was isolated from both the food and fecal specimens; and the *C. perfringens* isolates from eight patients were of the same serotype. The results confirm the usefulness of fecal spore counts and serotyping in implicating *C. perfringens* in food poisoning outbreaks.

3525 VARIATION IN ENTEROTOXIGENICITY OF Escherichia coli. (Eng.) Echeverria, P.; Louria, C. J.; Smith, A. L.; Smith, D. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *J. Infect. Dis.* 135(2):195-200; 1977.

To examine the possibility that the variable severity of diarrheal disease due to enterotoxigenic *Escherichia coli* is due to quantitative differences in the activity of heat-labile enterotoxin, the amount of toxin secreted by 13 enteropathogenic strains of *E. coli* was quantitated. The toxin-dependent increase in adenosine 3':5'-cyclic phosphate (cyclic AMP) was measured in Chinese hamster ovary cells. The activity ranged from 150 pmol of cyclic AMP/ml/mg protein to 4,040 pmol/ml/mg. With three representative strains, there was good correlation ($r=0.999$; $p<0.05$) between the amounts of cyclic AMP accumulated intracellularly (4,040, 2,071, and 470 pmol of cyclic AMP/ml/mg protein, resp.) and the ability of the filtrate to distend the rabbit ileal loop, as measured by the amounts of toxin required to produce half-maximal distension (50% effective dose, which had values of 11.5, 27.5, and 38.5 mg, resp.). The observed strain-to-strain variation in toxin activity may explain the variation in severity of diarrheal disease caused by enterotoxigenic *E. coli*.

3526 KWASHIORKOR NOT ASSOCIATED WITH POVERTY. (Eng.) John, T. J.; Blazovich, J.; Lightner, E. S.; Siebr, O. F., Jr.; Corrigan, J. J.; Hansen, R. (Univ. Arizona Medical Center, Tucson, AZ 85724). *J. Pediatr.* 90(5):730-735; 1977.

The case reports of four infants with kwashiorkor not associated with poverty or infection are presented. The condition followed various dietary regimens deficient in protein of 5-weeks to 7-months duration. The symptoms included growth retardation, edema, muscle wasting, mental changes (apathy, irritability, and anorexia), and mild lymphocytosis. Hepatomegaly was present in one infant. Treatment included feeding of soy or cow's milk formulas and vitamin supplementatio Initially, recovery was associated with a rapid weigh loss (due to loss of edema) and decreased hemoglobin and hematocrit levels (2 patients), followed by subsequent weight gain and return to good health. Physicians should be aware of this "sugar-baby" form of kwashiorkor and its symptoms.

3527 ELEMENTAL DIET AS AN ALTERNATIVE TO INTRAVENOUS NUTRITION IN SEVERE GASTROINTESTINAL DISEASES. (Ger.) Goschke, H.; Buess, H.; Gyr, K.; Leutenegger, A.; Ott, S.; Stalder, G. A.; *et al.* (Kantonsspital, CH-4004 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(2):43-49; 1977.

3528 DOES ALLERGY OF THE DIGESTIVE TRACT EXIST? (Ger.) Grilliat, J. P.; Moneret-Vautrin, D. A. (Hopital St. Julien, F-5400 Nancy, France). *Munch. Med. Wochenschr.* 118(52/53):1703-1708; 1976.

3529 PSYCHOLOGICAL FACTORS IN GASTROINTESTINAL DISEASES. (Ger.) Wieck, H. H. (Universitat-Nervenklinik mit Poliklinik, Schwabachanlage 10, 8520 Erlangen, W. Germany). *Fortschr. Med.* 95(9):531-534; 1977.

3530 THE INFLUENCE OF PIVMECILLINAM ON HUMAN GUT FLORA. (Ger.) Knothe, H. (Klinikum der Johann Wolfgang Goethe-Universitat, Zentrum der Hygiene, 6 Frankfurt/Main 70, Paul-Ehrlich-Strasse 40, W. Germany). *Arzneim. Forsch.* 26(3): 427-431; 1976.

3531 THE EFFECT OF ALCOHOL ON THE GASTROINTESTINAL TRACT. (Dut.) Janssens, J.; Vantrappen, G. (Kliniek van in Wendige Ziekten, A.Z. St.-Rafael, K.U.L., Netherlands). *Tijdschr. Gastroenterol.* 19(2):129-135; 1976.

3532 SERUM GASTRIN IN DIFFERENT GASTROINTESTINAL DISEASES: CLINICAL EXPERIENCE. (Ita.) Ferrari, A.; Mezzedimi, R.; Cavallero, M. (Ospedale Maggiore di San Giovanni Battista e della Citta di Torino, Turin, Italy). *Minerva Med.* 67(59):3881-3892; 1976.

3533 STATE OF ART OF TRANSPLANTATION OF GASTROINTESTINAL ORGANS. (Ger.) Largiader, F. (Kantonsspital, CH-8091 Zurich, Switzerland). *Med. Klin.* 72(4):112-119; 1977.

3534 CONGENITAL GASTROINTESTINAL DISORDERS MANIFESTED IN THE ADULT. (Ger.) Rosch, W. (Medizinische Universitatsklinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(5):263-266; 1977.

535 A TRIAL OF EVALUATING LIVER FUNCTION IN PATIENTS WITH CHRONIC RENAL FAILURE. Pol.) Kwiecinski, R.; Mazalon-Kumala, K. (Oddzial efrologiczny i Osrodek Dializ Woj. Szpitala espolonego, ul. Kosnego 53B. 45-372 Opole, Poland). *iad. Lek.* 30(4):261-265; 1977.

536 SEVERE CHRONIC CONSTIPATION: DIAGNOSIS AND THERAPY. (Ger.) Holschneider, A. .; Klehr, P.; Fendel, H. (Universitats-Kinder-linik Munchen, Lindwurmstrasse 4, D-8000 Munchen , W. Germany). *Paediatr. Paedol.* 11(2):403-416; 976.

537 CHANGES IN CALORIE INTAKE AND FUNCTIONS OF ENERGY EXPENDITURE IN PATIENTS PRESENT-NG WITH DIARRHEA. (Fre.) Denis, P.; Colin, R.; e Grix, A.; Pasquis, P.; Geffroy, Y.; Lefrancois, . (Faculte de Medecine, Hotel-Dieu, 76038 Rouen edex, France). *C. R. Soc. Biol. (Paris)* 170(5): 099-1103; 1976.

538 INDICATIONS FOR STOOL CULTURE AND ANTI-BIOTICS IN THE OUT-PATIENT TREATMENT F DIARRHEA DUE TO ACUTE GASTRO-ENTERITIS IN NFANTS. (Fre.) Leveque, B.; Lambert-Zechovsky, .; Cathlin, C. (Hopital Bretonneau, 75887 Paris, rance). *Ann. Pediatr.* 24(3):181-187; 1977.

539 THREE NEW SO-CALLED CONTACT LAXATIVES. (Fre.) Louant, P. H. (27-29, avenue ouret, B 7800 ATH, Belgium). *Ann. Radiol. (Paris)* 19(8):817-819; 1976.

540 MULTIPLE ENDOCRINE ADENOMATOSIS SYNDROMES. (Eng.) Schimke, R. N. (Univ. Kansas Iosp., KS). *Adv. Int. Med.* 21:249-265; 1976.

541 DETERMINATION OF GASTRIN IN THE SERUM AND GASTRIC BIOPSIES IN PATIENTS WITH ERNICIOUS ANEMIA. (Dan.) Brandsborg, M.; Elsborg, .; Andersen, D.; Brandsborg, O.; Bastrup-Madsen, P. medicinsk-haematologisk afdeling, Arhus amtssygehus, K-8000 Arhus C, Denmark). *Ugeskr. Laeger* 138(51): 261-3264; 1976.

3542 INTESTINAL DYSBACTERIOSIS AMONG PRACTICALLY HEALTHY AND SICK CHILDREN. (Rus.) Fatykhova, R. M.; Tyukova, N. I.; Bulanova, G. K. (District Hosp., Gorki, USSR). *Vopr. Okhr. Materin. Det.* 21(9):48-50; 1976.

3543 ACUTE NECROTIZING ENTERITIS AND COLITIS WITHOUT EVIDENT VASCULAR OBLITERATION. 7 PERSONAL CASES. (Fre.) Salah, H. H.; Belaid, S.; Achour, H.; Djerbi, A.; Mestiri, S. (No affiliation given). *Chirurgie* 102(6):449-456; 1976.

3544 COMPARATIVE ASSESSMENT OF THE EFFECT OF INTESTOPANE AND COLIBACTERIN ON THE MICROBIAL FLORA OF THE INTESTINE IN CHRONIC ENTEROCOLITIS. (Rus.) Zlatkina, A. R.; Misautova, A. A.; Makievskaya, S. E.; Paley, O. S. (First Clinic Therapy, M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. with Clinic, Moscow, USSR). *Ter. Arkh.* 48(12): 70-75; 1976.

3545 ON THE MECHANISM OF ENZYMORRHEA AND DERANGED ABSORPTION IN THE INTESTINE OF PATIENTS WITH CHRONIC ENTEROCOLITIS. (Rus.) Shamov, I. A.; Veksler, Ya. I.; Aslanova, N. R. (Propedeutic Dept. Internal Diseases, Dagestan Medical Inst., USSR). *Sov. Med.* (12):94-98; 1976.

3546 HEMORRHAGIC EROSIONS AS A CAUSE OF GASTROINTESTINAL BLEEDING. (Ger.) Ebert, H.; Hegewald, G. (Pathologische Institut der Ernst-Moritz-Arndt-Universitat, DDR-22 Greifswald, E. Germany). *Z. Gesamte Inn. Med.* 31(23):976-978; 1976.

3547 CLINICAL CHARACTERISTICS AND COURSE OF DRUG-INDUCED UPPER DIGESTIVE HEMORRHAGE. (Fre.) Tournut, R.; Pascal, J. P.; Frexinos, J.; Suduca, P.; Legrand, G.; Benarous, J. J.; *et al.* (Hopital Purpan, 31052 Toulouse Cedex, France). *Sem. Hop. Paris* 52(40):2283-2289; 1976.

3548 A CASE OF PEUTZ-JEGHERS SYNDROME. (Ita.) De Rocco, R.; Vizzi, F. (Ospedale Generale Provinciale "Ninetto Melli" San Pietro Vernotico, Italy). *Minerva Gastroenterol.* 22(4):301-310; 1976.

3549 A CASE OF PEUTZ-JEGHERS DISEASE: CONSIDERATIONS AFTER 19 YEARS. (Ita.) Franchi, M.; Lopez, M.; Sturlese, P. (Ospedale Civile di La Spezia, Italy). *Pathologica* 68(983/984):445-457; 1976.

3550 PLASMA LIPIDS AND LIPOPROTEINS IN PROTEIN-CALORIE MALNUTRITION. (Eng.) Devi, C. S.; Indira, K.; Chitra, D. R.; Devi, M. S.; Sagar, P. (Dept. Biochemistry, Andhra Medical Coll., Visakhapatnam 2 [AP], India). *Acta Paediatr. Scand.* 65(2):161-166; 1976.

3551 SYMPTOMS PRODUCED BY PATHOGENIC INTESTINAL PROTOZOA AND THEIR TREATMENT WITH METRONIDAZOLE (VAGIMID ORAL). COMMUNICATION 1: CLINICAL AND THERAPEUTIC ASPECTS. (Ger.) Zieger, B.; Muller, W. (Poliklinik des Bezirkskrankenhauses Dresden-Friedrichstadt, DDR-801 Dresden, Friedrichstr. 41, E. Germany). *Dtsch. Gesundheitsw.* 32(2):56-59; 1977.

GENERAL

3552 MALIGNANT NEOPLASMS OF THE DIGESTIVE SYSTEM IN PATIENTS UNDER AGE FORTY. (Spa.) Toruno, H. R. (Instituto Salvadoreno del Seguro Social, El Salvadore). *Arch. Col. Med. El Salvador* 29(2):21-27; 1976.

3553 RETROPERITONEAL LIPOSARCOMA. (Ita.) Cusumano, A.; Roviaro, G. C.; Frasson, P.; Maccari, T. (Universita di Padova, Istituto di Patologia Chirurgica, Padova, Italy). *Chir. Ital.* 28(3):232-250; 1976.

3554 PRIMITIVE RETICULOSARCOMA OF THE SALIVARY GLANDS. REPORT OF TWO CASES. (Spa.) Gutierrez, J. A. J. (Facultad de Ciencias Medicas, "Dr. Tomas Peron," de la Universidad Nacional de Cuyo, Mendoza, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 49(2):241-248; 1977.

3555 STUDY OF CERTAIN ASPECTS OF HEPATIC FUNCTION AND HISTOMORPHOLOGY IN OBESITY. (Ita.) Cravario, A.; Cravetto, C. A.; Messori, D.; Palestro, G. (Istituto di Clinica Medica, Universita degli Studi di Torino, Torino, Italy). *Minerva Med.* 67(63):4189-4194; 1976.

3556 PATHOGENIC CONSIDERATIONS ASSOCIATED WITH SYSTEMIC SCLERODERMA, SJOGREN'S SYNDROME AND CHRONIC ACTIVE HEPATITIS. (Fre.) Youinou, P.; Le Goff, P.; Blain, F.; Le Menn, G. (Hopital Morvan, 29279 Brest Cedex, France). *Sem. Hop. Paris* 53(3):179-183; 1977.

See also, 2685, 2962, 2987, 2996, 3052, 3058, 3089, 3092, 3113, 3125, 3131, 3158, 3170, 3183, 3184, 3215, 3230, 3245, 3256, 3260, 3272, 3286, 3327, 3332, 3367, 3478, 3483, 3488, 3574.

GENERAL

Parasitology

3557 FULMINANT NECROTIZING AMEBIC COLITIS IN CHILDREN. (Eng.) Balikian, J. P.; Bitar, J. G.; Rishani, K. K.; Kabakian, H. A. (American Univ. Medical Center, Beirut, Lebanon). *Am. J. Proctol.* 28(1):69-73; 1977.

The case of a 2.5-yr-old boy who died from necrotizing amebic colitis is presented. The patient presented with anorexia, occasional vomiting, and a 10-day history of diarrhea. A routine stool examination showed no ova or amebae. Proctoscopy showed necrotic rectal mucosa, and a biopsy disclosed ulcerations and *Entameba histolytic* trophozoites. The patient died before antiamebic therapy could be instituted. Roentgenograms of the abdomen showed evidence of peritonitis and a pericolic abscess; barium enema revealed a perforation in the cecum, with ulcerations throughout the colon. Amebiasis should be suspected in children presenting with diarrhea and/or acute abdomen; the diagnostic procedures should include stool examination, rectal scrapings or biopsy, and a plain abdominal film. Barium enema and surgery are contraindicated in the fulminant form of amebic colitis.

3558 GIARDIASIS IN COLORADO: AN EPIDEMIOLOGIC STUDY. (Eng.) Wright, R. A.; Spencer, H. C.; Brodsky, R. E.; Vernon, T. M. (Denver Disease Control Service, 605 Bannock St., Denver, CO 80204). *Am. J. Epidemiol.* 105(4):330-336; 1977.

A 1-yr retrospective laboratory survey of the epidemiology of giardiasis was carried out in Colorado. Six hundred ninety-one (3%) of 22,743 stool examinations for ova and parasites were positive for *Giardia lamblia,* a higher percentage than that reported from surveys outside of Colorado. The majority of infected residents surveyed had experienced an episode of chronic watery diarrhea (median duration 3.8 weeks) with bloating, flatulence, and weight loss (averaging 5.1 kg), and had responded to a course of metronidazole or quinacrine. A statewide telephone survey of 256 cases and matched controls identified: an increased incidence of giardiasis in persons between the ages of 16 and 45, $p<0.001$, with males and females equally affected; and a higher proportion of cases than controls who visited Colorado mountains (69% versus 47%), camped out overnight (38% versus 18%), and drank untreated mountain water (50% versus 17%), $p<0.001$. Also identified was a correlation between the seasonal distribution of cases and degree of fecal contamination of mountain streams. These results indicate that *G. lamblia* is endemic in Colorado and that drinking untreated mountain water is an important cause of endemic infection.

3559 INVASION OF SMALL INTESTINAL MUCOSA BY Giardia lamblia IN MAN. (Eng.) Saha, T. K.; Ghosh, T. K. (P-5, Lake Town, Block B, Calcutta 55, India). *Gastroenterology* 72(3):402-405; 1977.

Mucosal biopsies from the duodenum and jejunum of 31 patients with fecal *Giardia lamblia* cysts and/or trophozoites were studied histologically. Trophozoites were found in the lumen of all biopsy specimens. In 12 patients, all of whom had diarrhea and steatorrhea, trophozoites were also found within the mucosa. They were seen at different stages in different sections, from the stage of entry into the epithelium up to their migration into the lamina propria. In two cases, the route of entry of the parasite into the mucosa was detected. In the first instance, one trophozoite had entered the mucosa, leaving behind a track-like space through which a second parasite had introduced its tail. Among the 12 patients in whom the trophozoite had entered the mucosa, 5 had normal mucosal architecture. In the remaining patients, partial villous atrophy and inflammatory cellular infiltration was present. Goblet cells were increased in all seven cases, and basal nuclear polarity was lost in six. Among the 19 patients without mucosal invasion, 17 had mucosal damage; the other 2 had changes similar to those seen in the patients with mucosal invasion.

3560 STUDIES ON SCHISTOSOMAL RECTAL AND COLONIC POLYPOSIS. (Eng.) Smith, J. H.; Said, M. N.; Kelada, A. S. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Trop. Med. Hyg.* 26(1): 80-84; 1977.

To determine the etiology of schistosomal polyposis, colonic and rectal specimens from 30 patients with this complication were studied histologically. Schistosome eggs were commonly found in the muscularis mucosa at the base of both colonic and rectal polyps. Polyps occurred at sites where the number of schistosome eggs was concentrated, regardless of which species was present (i.e., *S. haematobium* or *S. mansoni*. The muscularis mucosa was obliterated by evolving granulomatous lesions or by calcified eggs in dense fibrotic tissue. The egg burdens in areas of rectal and colonic polyposis were 7,796 ± 2,860 eggs/g tissue and 2,114 ± 742 eggs/g, resp., for *S. haematobium* and 8,675 ± 2,217 and 18,629 ± 3,362 eggs/g, resp., for *S. mansoni*; the corresponding values for the respective species in noninvolved areas of the colon were 1,860 ± 1,155 and 556 ± 348 eggs/g. The findings indicate that colonic and rectal schistosomal polyposis is due to concentrated oviposition, which results in perforation and scarring of the rectocolonic muscularis mucosa.

3561 CHRONIC HUMAN SCHISTOSOMIASIS MANSONI: PATHOLOGY OF THE DISSE'S SPACE. (Eng.) Grimaud, J. A.; Borojevic, R. (Institut Pasteur, 77, rue Pasteur, 60365 Lyon, Cedex 2, France). *Lab. Invest.* 36(3):268-273; 1977.

The pathology and ultrastructure of Disse's spaces were studied in 22 patients with chronic schistosomiasis. In the space of Disse, a fine fibrillar layer was found within the strata of a bilayered endothelium and under the innermost endothelial cells. It was irregular and sometimes discontinuous, resembling a basement membrane. The space was wider than normal, containing thick bundles of collagen and isolated dispersed collagen fibers. The irregular projections of the hepatocytes, together with cell debris and collagen, completely filled the Disse's space. Other abnormalities in the hepatic lobule included hepatic sinusoids with hypertrophy and stratification of the endothelium, basement membrane-like deposits, perisinusoidal fibrosis, diminution of hepatocellular microvilli, and hepatocellular clasmatosis into the sinusoidal circulation. This transformation of an open circulation to a partly closed one may decrease the blood hepatocyte exchanges in schistosomiasis.

3562 ENZYME-LINKED IMMUNO-ELECTRO DIFFUSION ASSAY. (Fre.) Pinoń, J. M.; Dropsy, G. (Hopital de Reims, 51100, Reims, France). *Bull. Soc. Pathol. Exot.* 69(3):238-244; 1976.

3563 THERAPY OF INTESTINAL PARASITOSIS. (Ger.) Stahel, E. (Departement fur Innere Medizin der Universitat, CH-8091 Zurich, Ramistr. 100, Switzerland). *Dtsch. Med. Wochenschr.* 102(4):133-135; 1977.

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3567 SUBACUTE AMEBIC COLORECTITIS. CLINICAL AND THERAPEUTIC ASPECTS. (Fre.) Christoforov, B.; Duflo, B.; Laffitte, M.; Piette, F.; D'Izarn, J. S. (Hopital Cochin, 27, rue du Faubourg Saint-Jacques, F 75674 Paris Cedex 14, France). *Ann. Med. Interne (Paris)* 127(12):887-890; 1976.

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3570 LAMBLIASIS INDUCED CHOLECYSTITIS. (Rus.) Turbin, B. N.; Ivashchenko, V. V. (A. M. Gor'kii Donetsk Medical Inst., Donetsk, USSR). *Vestn. Khir.* 116(8):20-22; 1976.

3571 KALA-AZAR IN CHAD. SIX-YEAR SURVEY CONDUCTED BY THE CENTRAL HOSPITAL OF N'DJAMENA (FORT-LAMY). (Fre.) Sirol, J.; Vedy, J.; Barabe, P.; Cesari, C.; Berger, P. (Hopital d'Instruction des Armees, F. 13998 Marseille-Armees, France). *Bull. Soc. Pathol. Exot.* 69(3):232-237; 1976.

3572 CLINICAL PICTURE AND MANAGEMENT OF PATHOLOGICAL INTESTINAL PROTOZOANS WITH METRONIDAZOLE (VAGIMID ORAL®). (Ger.) Zieger, B.; Muller, W. (Friedrichstadt Poliklinik, DDR-801 Dresden, Friedrichstr. 41, E. Germany). *Dtsch. Gesundheitsw.* 32(5):220-223; 1977.

3573 CRITERIA OF IDENTIFICATION OF Schistosoma haematobium AND Schistosoma mansoni SCHISTOSOMIASIS (468 PATIENTS, 275 CASES OF SCHISTOSOMIASIS). (Fre.) Pieron, R.; Mafart, Y.; Lesobre, B.; Lancastre, F.; Meyniel, D.; Wolff, M.; *et al.* (Hopital Tenon, 75970 Paris Cedex 20, France). *Sem. Hop. Paris* 53(6):353-360; 1977.

3574 COMPARATIVE MORPHOLOGY AND PATHOGENESIS OF LESIONS OF THE GASTROINTESTINAL TRACT IN ACUTE INTESTINAL INFECTIONS--SHIGELLOSIS AND SALMONELLOSIS. (Rus.) Blyuger, A. F.; Terentieva, L. A.; Veksler, Kh. M.; Novitsky, I. N.; Sumlyaninova, N. P.; Brake, Zh. K. (Riga Medical Inst., Riga, USSR). *Vestn. Akad. Med. Nauk SSSR* (10):69-77; 1976.

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See also, 2829, 2958, 2988, 3026, 3274, 3287, 3530.

GENERAL

Regional Enteritis

3576 SULPHASALAZINE IN ASYMPTOMATIC CROHN'S DISEASE: A MULTICENTRE TRIAL. (Eng.) Lennard-Jones, J. E.; Baron, J. H.; Bennett, P. N.; Swarbrick, E. T.; Coghill, N. F.; *et al.* (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Gut* 18(1):69-72; 1977.

The possible value of sulphasalazine in the reduction of the relapse rate after resection or in asymptomatic patients with established disease was investigated. During a 6-yr period, 43 patients were included in a double-blind, controlled trial of sulphasalazine for 1 yr. There were two relapses in the control group and four in the sulphasalazine group. Five patients developed complications of their disease, one of whom died. Two patients in the control group and eight in the sulphasalazine group stopped treatment due to side-effects. No trend in favor of sulphasalazine over the control group was observed. The difficulties of trials such as this include the small number of patients, the varied nature of the disease, and the high incidence of complications.

3577 REGIONAL ILEITIS (CROHN'S DISEASE). II. ELECTROLYTE AND WATER MOVEMENT IN THE ILEUM DURING PERFUSION WITH BILE ACIDS. (Eng.) Krag, B.; Krag, E. (Gentofte Hosp., Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(5):487-490; 1976.

Electrolyte and water movement was studied by steady state perfusion in the ileum of 11 patients with regional ileitis. Six patients, who at the time of the investigation had diarrhea, showed a constant water and salt secretion during control perfusion; water secretion was 0.2 ml/min/25 cm ileum. The patients without diarrhea showed a mean absorption of 0.6 ml/min/25 cm ileum. When the ileum was perfused with a solution containing 0.25-2.50 mM glycochenodeoxycholic acid, electrolyte and water secretion was enhanced in the patients with diarrhea, and absorption was decreased in the patients without diarrhea. It is concluded that functional disturbances of salt and water absorption in the inflamed ileum may be important in the pathogenesis of diarrhea in patients with regional ileitis.

3578 UROLOGICAL COMPLICATIONS IN CHRONIC INFLAMMATORY DISEASES OF THE BOWEL. (Eng.) Sigel, A.; Botticher, R.; Wilhelm, E. (Urologische Universitatsklinik, Maximiliansplatz, D-852 Erlangen, W. Germany). *Eur. Urol.* 3(1):7-10; 1977.

Urological complications of inflammatory bowel disease (i.e., Crohn's disease, ulcerative colitis, and colon diverticulitis) are reviewed. Characteristically, there are two different processes by which urological complications occur: either penetration into the urinary bladder and formation of a colo- or ileovesicle fistula or unilateral inflammatory penetration into the retroperitoneum, which may constrict the ureter by fibrosis and produce obstructive damage to the kidney. Colovesical fistula is found more frequently in diverticulitis than in Crohn's disease, which penetrates predominantly from the ileum into the bladder. Right-sided ureteral stenosis is caused by Crohn's disease, while left-sided ureteral stenosis is caused by ulcerative colitis. Vesico-intestinal fistulae close without sequelae after resection of the diseased bowel segment, but the presence of retroperitoneal ureteral stenosis often necessitates nephrectomy, if bowel resection and ureterolysis is not carried out early enough. Nephrolithiasis, amyloidosis, and contracted bladder are other, less common, complications of chronic inflammatory bowel diseases.

3579 EFFECT OF CROHN'S DISEASE ON COLONIC DIVERTICULA. (Eng.) Berridge, F. R.; Dick, A. P. (Addenbrooke's Hosp., Cambridge, England). *Br. J. Radiol.* 49(587):926-929; 1976.

To study the effect of Crohn's disease on colonic diverticula, the cases of 15 patients in whom diverticular disease and Crohn's disease affected the same colonic segment were studied; the case reports of two such patients are presented. Thirteen patients who had more than one barium enema examination were divided into four groups: no change in diverticula when Crohn's disease spread to that part of bowel (2), diminished number of diverticula (6), complete disappearance of diverticula when the affected bowel became involved with Crohn's disease (3), and appearance of diverticula in an area of bowel previously affected by Crohn's disease (2). The disappearance of diverticula with the development of Crohn's disease and their reappearance in remission is probably related to the tone of the bowel wall, which, in turn, is affected by the amount of induration, edema, and/or fibrosis present.

3580 LYMPHOCYTE SUBPOPULATIONS IN CROHN'S DISEASE AND CHRONIC ULCERATIVE COLITIS. (Eng.) Sorensen, S. F.; Hof, L. (Rigshospitalet, Tagensvej 18, DK-2200 Copenhagen N, Denmark). *Acta Pathol. Microbiol. Scand.* [*C*] 85(1):41-48; 1977.

Lymphocyte subpopulations were studied in 16 patients with Crohn's disease and 16 patients with ulcerative colitis. None of these patients was on corticosteroids or cytostatics, but 25 received salicylazosulphapyridine. Circulating lymphocytes were significantly reduced in patients with Crohn's disease ($p<0.05$), with all subpopulations being equally involved. This nonselective decrease may be caused by actual cell loss into the affected gut lumen. Patients with ulcerative colitis had normal total lymphocyte counts. While both the B- and T-lymphocyte counts were unchanged in ulcerative colitis, the number of lymphocytes carrying neither sheep RBC receptors nor surface immunoglobulins was twice the control values ($p<0.01$). These may possibly be the same cells that have been shown to specifically lyse colonic epithelial cells *in vitro*. Although treatment with salicylazosulphapyridine *per se* does not seem to influence T-lymphocyte counts, colitis patients receiving this drug had distinctly higher counts than untreated patients.

3581 PRESENT TREATMENT OF CROHN'S DISEASE. (Fre.) Girodet, J.; Rougier, P.; Mignon, M.; Bonfils, S. (Hopital Bichat, 170, boulevard Ney, 75018 Paris, France). *Rev. Prat.* 26(59):4257-4263; 1976.

3582 DUODENAL CROHN'S DISEASE. (Ita.) Luminari, M.; Ronchetti, P. G.; Giannelli, C. (Pio Istituto di S. Spirito, Rome, Italy). *Minerva Gastroenterol.* 22(4):291-299; 1976.

3583 ASSOCIATION OF CROHN'S DISEASE AND AMYLOIDOSIS. REPORT OF ONE CASE. (Fre.) Galmiche, J. P.; Malhuret, A.; Mignon, F.; Mignon, M.; Bonfils, S. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Nouv. Presse Med.* 6(2):105-108; 1977.

See also, 2997, 3076, 3077, 3220, 3308, 3318, 3320, 3321, 3527.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism a Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal trac Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.
Albanian	Alb.
Arabic	Ara.
Armenian	Arm.
Azerbaijani	Aze.
Belorussian	Bel.
Bengali	Ben.
Bulgarian	Bul.
Burmese	Bur.
Chinese	Chi.
Croatian	Cro.
Czechoslovakian	Cze.
Danish	Dan.
Dutch	Dut.
English	Eng.
Esperanto	Esp.
Estonian	Est.
Finnish	Fin.
Flemish	Fle.
French	Fre.
Gaelic	Gae.
Georgian	Geo.
German	Ger.
Greek	Gre.
Hausa	Hau.
Hebrew	Heb.
Hindi	Hin.
Hungarian	Hun.
Icelandic	Ice.
Indonesian	Ind.
Interlingua	Int.
Italian	Ita.
Japanese	Jpn.
Kirghiz	Kir.
Korean	Kor.
Latin	Lat.
Latvian	Lav.
Lithuanian	Lit.
Marathi	Mar.
Masai	Mas.
Multilingual	Mlt.
Norwegian	Nor.
Persian	Per.
Polish	Pol.
Portuguese	Por.
Pushto	Pus.
Rumanian	Rum.
Russian	Rus.
Serbian	Ser.
Slovak	Slo.
Slovene	Slv.
Spanish	Spa.
Swahili	Swa.
Swedish	Swe.
Tagalog	Tag.
Tamil	Tam.
Telugu	Tel.
Thai	Tha.
Turkish	Tur.
Ukranian	Ukr.
Urdu	Urd.
Vietnamese	Vie.
Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

3584 HISTOCHEMISTRY OF MICROVASCULAR SMOOTH MUSCLE IN THE GASTROINTESTINAL TRACT. (Eng.) Granger, D. N.; Cook, B. H.; Granger, H. J.; Taylor, A. E. (Univ. Mississippi Medical Center, Jackson, MS 39216). *Microvasc. Res.* 12(2):157-167; 1976.

Metabolic heterogeneity of vascular smooth muscle in the submucosa of stomach, ileum, and colon was demonstrated by histochemical localization of enzymes representing major metabolic pathways. Biopsies of stomach, terminal ileum, and colon from 10 dogs were stained using standard histochemical techniques. Colon and stomach microvessels showed similar patterns of metabolic activity, including a potential for β-oxidation of fats (β-hydroxybutyrate dehydrogenase), a moderate level of anaerobic glycolysis (lactate dehydrogenase), and ATP production (isocitrate dehydrogenase, NAD diaphorase, and cytochrome oxidase). The colon, however, exhibited very high hexose monophosphate shunt activity, while this pathway was absent in stomach microvasculature. Neither of these tissues stored glycogen or neutral fat, yet, unlike the stomach, the colon did store free fatty acids. Ileal microvessels stored high levels of free fatty acids and glycogen and a small amount of neutral fat. The ileum showed a greater potential for anaerobic glycolysis, also exhibiting a potential for β-oxidation of fats and ATP production similar to that of stomach and colon vessels. Hexose monophosphate shunt activity was high in ileal vessels, and nonspecific esterase activity was moderate. Vessels in all three tissues were rich in myosin ATPase indicating availability for muscle contraction.

3585 ANALYSIS OF THE EFFECTS OF FOOD AND OF DIGESTIVE SECRETIONS ON THE SMALL INTESTINE OF THE RAT. I. MUCOSAL MORPHOLOGY AND EPITHELIAL REPLACEMENT. (Eng.) Clarke, R. M.; Ecknauer, R.; Feyerabend, G. (Faculty Medicine, Univ. Newcastle, Newcastle, 2308 N.S.W., Australia). *Gut* 17(11):895-899; 1976.

To separate the influence of bile and pancreatic secretions from the influence of food on mucosal morphology and epithelial replacement, a modified Roux-en-Y repositioning of rat small intestine was performed. The proximal segment (A) received only pancreatic and bile secretions; the second portion (B) received food and gastric juices directly from the stomach, and the distal segment (C) drained both segments A and B. Male (21) CHBB rats were used: seven were operated as described, seven were sham operated, and seven went unoperated. Five weeks after surgery, vincristine was injected, i.p., and the intestines removed. Cell production was assessed as well as villus height, crypt depth, and the crypt villus ratio in each of the three groups. Vincristine metaphase counts were higher ($p<0.001$) in segment B and segment C ($p<0.01$) of the operated animals than in the sham-operated or unoperated animals. In segment C, villus height was significantly greater ($p<0.05$) in operated than sham-operated rats. In segments A and B, the villus heights were not significantly different, but the proximo-distal gradient of villus height appeared to be abolished in the operated animals. The crypt depth was significantly increased in the operated rats for all specimens of the intestine taken distal to the terminal portion of A ($p<0.05$, $p<0.01$, $p<0.001$ for various specimens). The crypt/villus ratio was significantly higher in 3/4 sites examined in segment C of the operated rats. In segment B this ratio was significantly higher in operated than sham-operated rats at 2/3 sites, while there were no significant differences between operated and unoperated rats. Some of these changes in intestinal histology could be due to alterations in the output of gastrointestinal polypeptide hormones; however, it is more likely that these hormones cause systemic rather than local effects. A serious defect exists in this experimental model, because of the possibility that gastric secretions damaged the intestinal mucosa in segment B and caused changes that cannot necessarily be ascribed to food alone.

3586 MORPHOLOGY AND DISTRIBUTION OF THE "VASA RECTA" IN THE JEJUNOILEAL TRACT OF THE SMALL INTESTINE. (Ita.) Vitiello, F. S. (Cattedra di Anatomia Topografica, Univ. degli Studi, Rome, Italy). *Minerva Chir.* 30(13/14):813-816; 1975.

The course and distribution of the vasa recta in the jejunoileal tract of the small intestine was studied in 12 middle-aged subjects without vascular impairment of the abdominal aorta or anatomicopathological modifications of the gastroenteric apparatus. The investigation was made by x-ray after injection of contrast medium through a catheter in the mesenteric artery and by subsequent ligation of the jejunal and ileal arteries. It was found that the long and short vasa recta make up the terminal circulation of the small intestine. The long vasa recta are more numerous than the short, and their density and length decreases progressively in craniocaudal direction. The long vasa recta always originate from parallel arterial arcades, while the short may also originate from accessory arcades formed by anastomoses between the long vasa recta. Ramifications of the short vasa recta penetrate the intestinal wall. The vasa recta constitute an ideal vasculature for the entire intestinal wall as their anastomoses allow sufficient supplementary circulation in case of vascular resection during surgery or as a result of traumatic lesions.

3587 THE NORMAL RADIOLOGICAL ANATOMY OF THE HEMORRHOIDAL VASCULAR NETWORK. PRELIMINARY NOTE ON THE BASIS OF A STUDY OF 15 CASES. (Fre.) Bernard, A.; Parnaud, E.; Guntz, M.; Chome, J. (Hopital des Diaconesse 16, rue du Sergent Bauchaut F 75012 Paris, France). *Ann. Radiol.* 20(5):483-489; 1977.

The hemorrhoidal vascular network was studied in 15 patients by angiography (abdominopelvic angiography and selective inferior mesenteric arteriography), microscopy, anatomy, and radiography. Autopsy specimens were obtained from six patients and 30 samples taken during hemorrhoidectomies were studied histologically. In some instances, tissue samples were taken during removal of a rectal tumor. Several types of arterial vascularization were found. The principal arterial pathways followed the anterior and posterior right and left lateral walls of the anal canal. The superior hemorrhoidal artery seemed to be the principal rectal artery and was mostly found on the external surface of the rectum before perforating the rectal tunica 7-10 cm from the anus. The secondary branches perforated the rectal wall and disseminated into the submucosa. Abundant anastomoses were found between the branches of the superior hemorrhoidal vein, on the external surface of the rectal ampulla, and in the submucosa. Microscopy also revealed numerous nervous system elements, arteriovenous anastomosis and large vascular spaces. It is suggested that hemorrhoidal venous pools have a true regulatory role supplemental to that of the smooth muscle fibers of the anal submucosal musculature.

3588 DISTRIBUTION OF CARBONIC ANHYDRASE WITHIN THE GASTRIC MUCOSA. (Eng.) O'Brien, P.; Rosen, S.; Trencis-Buck, L.; Silen, W. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5): 870-874; 1977.

The distribution of carbonic anhydrase within the gastric mucosa was studied biochemically and histochemically. Bullfrog fundic mucosa was separated into fractions containing predominantly surface epithelial cells, mucous neck cells, and oxyntic cells, resp., and the carbonic anhydrase concentration of each fraction and of antral mucosa was measured. There were no significant differences between the enzyme concentrations of these fractions. The mean level was 12.4 U of activity/mg of protein. The cellular localization of carbonic anhydrase in the gastric fundic and antral mucosa of the bullfrog, rat, rabbit, and dog was studied using a specific histochemical technique. The enzyme was present in both parietal and nonparietal epithelium of all species and characterized a specific cell type in the dog antrum. The widespread distribution of high levels of carbonic anhydrase activity in both acid secreting and nonsecreting cells of the gastric mucosa suggests a possible role for the enzyme beyond one solely relating to acid secretion.

3589 A CLINICAL AND ANATOMICAL STUDY OF ANOMALOUS TERMINATIONS OF THE COMMON BILE DUCT INTO THE DUODENUM. (Eng.) Lindner, H. H.; Pena, V. A.; Ruggeri, R. A. (Sch. Medicine, Univ. California, San Francisco, CA). *Ann. Surg.* 184(5):626-632; 1976.

One thousand operative cholangiograms, selected out of 2,500 for clarity and interpretability from five San Francisco Bay Area hospitals, were studied to emphasize that a sizeable proportion of the sites of entrance of the bile duct into the duodenum are anomalous and therefore of major clinical significance. In 86.9% of the patients, the common bile duct entered the descending duodenum, but in 13.1% of the individuals, it entered either the junction between the descending and transverse duodena or the transverse duodenum. In another 5%, the duodenal eminence was well below the level of the crossing of the duodenum by the transverse colon. It is evident that the biliary ampulla and eminence are not always readily accessible through a duodenotomy incision, and presentation of the papilla through this incision might frequently entail time-consuming surgical manipulation and add to surgical morbidity. The creation of false biliary passages secondary to operative procedures on the distal common duct, though rare, could be avoided through awareness of the abnormal morphology. A cholangiogram prior to radical pancreatectomy should be carried out to demonstrate the site of entry of the common duct, greatly reducing the possibility of a postoperative pancreato-biliary fistula. In cases where the common duct is blocked by a stone or neoplasm and its distal portion cannot be filled with dye, the surgeon should proceed with caution so that a false passage is not made.

3590 HISTOENZYMOLOGICAL CHARACTERISTICS OF THE INTESTINAL MUCOUS MEMBRANE DURING THE EXPERIMENTAL FORMATION OF EXTERNAL INTESTINAL FISTULA. (Rus.) Topuria, Z. M.; Chkheidze, R. D. (Tbilisi State Medical Inst., Tbilisi, USSR). *Bull. Acad. Sci. Georgian S.S.R.* 84(1):213-215; 1976.

3591 ENDOCRINE CELLS OF THE COLON AND RECTUM IN NORMAL MAN: ULTRASTRUCTURAL STUDY [Abstract]. (Fre.) Cristina, M. L.; Lehy, T.; Zeitoun, P. (INSERM U-10, Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 9:310; 1976.

3592 MOLECULAR FORMS OF GASTRIN AND CHOLECYSTOKININ IN TISSUE AND BLOOD [Abstract]. (Eng.) Rehfeld, J. F.; Larsson, L. I. (Inst. Medical Biochemistry, Univ. Arhus, Arhus, Denmark). *Rend. Gastroenterol.* 9(1):65; 1977.

3593 ON THE POSSIBLE RELATIONSHIP BETWEEN NUMBER OF ANTRAL G-CELLS, MUCOSAL GASTRIN AND PLASMA GASTRIN LEVELS IN NORMAL SUBJECTS [Abstract]. (Eng.) Biasco, G.; Salera, M.; Santini, D.; Di Febo, G.; Baldi, F.; Miglioli, M.; *et al.* (Cattedra di Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):72; 1977.

3594 EFFECT OF VAGOTOMY ON THE TOTAL MASS OF GASTRIN CELLS IN THE RAT STOMACH. (Fre.) Delince, P.; Nyst, M.; Willems, G.; de Graef, J. (Laboratoire de Chirurgie Experimentale L.-Deloyers, Universite Libre de Bruxelles, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9:305; 1976.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

3595 TOPOGRAPHIC PECULIARITIES OF THE ULTRASTRUCTURE OF THE PARIETAL CELLS OF THE GASTRIC MUCOSA (MORPHOMETRIC STUDY). (Rus.) Morozov, I. A. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 82(11):1390-1394; 1976.

3596 SEQUENTIAL EFFECTS OF PROTEIN-CALORIC MALNUTRITION (PCM) ON THE ULTRASTRUCTURE OF RAT PAROTID ACINAR CELLS [Abstract]. (Eng.) Alvares, O.; Worthington, B.; Johnson, D.; Sreebny, L. (SUNY, Stonybrook, NY). *J. Dental Res.* 56(B): B112; 1977.

3597 EXPERIMENTAL STUDY ON THE CORRELATION BETWEEN THE PANCREAS AND PAROTID GLAND. 7TH REPORT, LIGHT MICROSCOPIC AND ELECTRON MICROSCOPIC STUDY OF THE RAT PANCREAS FOLLOWING BILATERAL LIGATION OF THE PAROTID GLAND DUCT. (Jpn.) Kakizaki, G.; Saito, G.; Soeno, T.; Sasahara, M.; Nihei, T.; Fujiwara, Y.; Ishidate, T.; Senoo, A. (Akita Univ. Sch. Medicine, Japan). *Jpn. J. Gastroenterol.* 73(6):638-648; 1976.

See also, 3640, 3643, 3679, 3683, 3710, 3720, 3726, 3744, 3759, 3769, 3815, 3824, 3825, 3827, 3868, 3880, 3884, 3888, 3890, 3916, 3923, 4065, 4070, 4130, 4133, 4148, 4190, 4248, 4261, 4288, 4289, 4362.

ABSORPTION - EXCRETION - TRANSPORT

3598 AN IN VIVO INVESTIGATION OF BARIUM MEALS. (Eng.) Simmonds, R. J.; James, A. M. (Dept. Chemistry, Bedford Coll., Univ. London, Regent's Park, London NW1 4NS, England). *Cytobios* 16(61):13-21; 1976.

An *in vivo* technique is described for the quantitation of barium sulfate retained in rat small intestine. In normally fed controls, the average weight of barium sulfate recovered from a 5-cm length of gut was 73.6 mg. Fasting and/or 24 hr of a sugar diet greatly lowered the amount of barium retained. In the pH range 4-8, the weight of radiopaque substance taken up remained constant. In stabilized preparations, the amount retained increased with the concentration of the suspension, up to a limiting value. When the gut was perfused with a mucolytic agent (*N*-acetylcysteine) before the radiopaque meal, the final weight of barium retained was as little as 20% of control values. Clinically, it would appear that a high level of stabilizing agent in the barium meal and a low-residue diet instead of a fast would improve the uniformity of coverage and the consistency of results.

3599 FATE OF ORALLY ADMINISTERED β-ACETYLDIGOXIN IN MAN. (Ger.) Flasch, H.; Schumpelick, V.; Koch, G. (Pharma-Forschung der Beiersdorf AG, Unnastrasse 48, 2000 Hamburg 20, W. Germany). *Arzneim. Forsch.* 27(3):656-659; 1977.

The fate of orally administered ^{3}H-β-acetyldigoxin (^{3}H-AC), 10 ml in 10% alcohol-water mixture, was investigated in 11 patients between the ages of 32 and 53 yr. Aspirates of gastric and duodenal contents were taken by stomach tube 5, 10, 25, 40, and 60 min after administration of drug in eight patients. Blood samples were taken intraoperatively from the portal vein after intraduodenal application of ^{3}H-AC in three patients who underwent cholecystectomy. Radioactivity in aspirates was determined in a Tricarb-Scintillation spectrometer and metabolites were extracted by chromatography. Analysis showed that after p.o. administration 90% of the drug remained unchanged in the stomach after 10 min and 43% after 60 min. Chromatography of gastric contents indicated that a small portion of ^{3}H-AC was changed to digoxin (5.5%), digoxigenin-bis-digitoxosid (0.9%), digoxigenin-mono-digitoxosid (1.3%), and digoxigen (2.3%). α-Acetyldigoxin was detected in duodenal contents. Digoxin (93%) was the main metabolite found in the portal vein. ^{3}H-AC passes rapidly through the stomach with a half-life of 10 min, and most of the glycoside is absorbed unchanged by passage through the intestinal wall. Digoxin is the active substance that reaches the heart.

3600 A STUDY OF THE ABSORPTION OF A BASIC DIET ADMINISTERED BY CONTINUOUS JEJUNAL PERFUSION: THE EFFECT OF THE RATE OF PERFUSION AND THE CONCENTRATION UPON THE ABSORPTION OF THE NUTRIENTS. (Fre.) Vidon, N.; Hecketsweiler, P.; Cortot, A.; Bernier, J. J. (INSERM U-54, Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(3):257-266; 1977.

The mechanisms of jejunal absorption of a basic diet (amino acids, glucose, and polyglucose chains) were studied in 30 healthy volunteers by the triple lumen tube perfusion method. The nutrient solution was perfused into the intestine at the level of the ligament of Treitz, and absorption was measured at 35-, 70-, and 105-cm lengths of the jejunum after 3-hr continuous perfusion. The concentration of the nutrients was 620 or 280 mOsm/kg and the flow rate was 1-4 ml/min. The quantity of carbohydrates absorbed increased with the length of the intestine traversed and the quantity perfused. Absorption decreased from the proximal to the distal segment or from the angle of Treitz to the ileum. Nitrogen was definitely absorbed in the first 35 cm below the point of infusion, and the efficiency of absorption increased in proportion to the amount perfused and in proximal areas of the intestine in comparison with distal segments. The osmolarity of the nutrients had little or no effect on the absorption. These experiments show that, at a flow rate of 3 ml/min, more than 1,170 kcal can be obtained in 24 hr in 35 cm of the jejunum and that the energy absorption decreases when the flow rate increases.

3601 EFFECTS OF BILE ACIDS, LECITHIN, AND MONOOLEIN ON AMINO ACID ABSORPTION FROM THE HUMAN DUODENUM.

(Eng.) DiMagno, E. P.; Malagelada, J.; Go, V. L. W. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Proc. Soc. Exp. Biol. Med.* 154(3):325-330; 1977.

Effect of lecithin, monoolein, and conjugated trihydroxy and dihydroxy bile acids on duodenal absorption of essential amino acids (EAA) was studied in healthy male volunteers. Groups of five subjects were given 100-min intraduodenal perfusions containing 13, 26, 52, and 78 mM of EAA mixture; the 78 mM mixture contained 10.65 mM threonine, 12.95 mM valine, 5.15 mM methionine, 11.25 mM isoleucine, 16.8 mM leucine, 6.7 mM phenylalanine, 13.45 mM lysine, and 1.05 mM tryptophan. Gastric and duodenal aspirates were analyzed for a nonabsorbable polyethylene glycol marker, and EAA absorption was calculated. Approximately 50% of the total EAA perfused was absorbed; methionine was absorbed most rapidly, isoleucine, leucine, and valine slightly more slowly, and lysine and threonine at the slowest rates. Groups of three to seven men were given intraduodenal 78 mM EAA perfusions in combination with 5 or 10 mM sodium taurocholate (TC), sodium chenodeoxycholate (TCDC), sodium taurodeoxycholate (TDC), monoolein (MO), TC + MO, or TC + lecithin. Significant ($p<0.01$) decreases in absorption of all EAA occurred with TC (50%) and TDC (65%). The 26% decrease in EAA absorption in the presence of TCDC was not significant. MO alone had no effect on EAA absorption, but added in conjunction with 10 mM TC MO restored EAA absorption to normal. Endogenous EAA secretion into the duodenum during saline (3 subjects) or TC (2 subjects) perfusion was minimal (about 3% of total EAA absorbed and <2% EAA perfused). The mechanism of bile acid inhibition of duodenal EAA absorption and its restoration by MO or lecithin was not elucidated by this study.

3602 ABSORPTION OF SHORT-CHAIN FATTY ACIDS FROM THE HUMAN ILEUM.

(Eng.) Schmitt, M. G., Jr.; Soergel, K. H.; Wood, C. M.; Steff, J. J. (2300 North Rockton Ave., Rockford, IL 61101). *Am. J. Dig. Dis.* 22(4):340-347; 1977.

The ileal absorption of the major short-chain fatty acids (SCFA) was investigated in eight normal volunteers by the triple-lumen perfusion technique. Each test solution contained acetate, propionate, or *n*-butyrate at a concentration of 0-100 mM; sodium, potassium, and bicarbonate concentrations were kept constant, as were pH and osmolality. Absorption of each SCFA was rate-limited with an apparent K_m between 22 and 27 mM and a calculated V_{max} between 0.54 and 0.82 mmol/hr/cm. Water, sodium, and chloride transport were not affected by substantial rates of SCFA absorption. Significant stimulation of calculated bicarbonate secretion and a rise in intraluminal pH were consistently observed. The results are compatible with either of two mechanisms for SCFA absorption: an anion exchange between bicarbonate (or hydroxyl) and SCFA ions, or protonation of the SCFA anion at the mucosal surface followed by simple diffusion of nonionized SCFA into the absorbing cell.

3603 INTESTINAL LYMPH FLOW AND LYMPHATIC TRANSPORT OF PROTEIN DURING FAT ABSORPTION.

(Eng.) Turner, S. G.; Barrowman, J. A. (London Hosp. Medical Coll., London E1 2AD, England). *Q. J. Exp. Physiol.* 62(2):175-180; 1977.

A substantial amount of protein appears to enter intestinal lymph following a fat meal of long-chain triglycerides (LCT) or medium-chain triglycerides (MCT). A volume of 0.5 ml of either LCT (85% triolein, 10% tripalmitin, and small amounts of trilinolein and tristearin), MCT (81% octanoic, 16% decanoic, and small amounts of hexanoic and dodecanoic acids), or 0.9% NaCl (test meal) were washed into the cannulated duodena of male Wistar rats with 0.5 ml 0.9% NaCl. The meal was administered 18 hr following cannulation of the duodenum and the main small intestine lymphatic vessel. Lymph was collected from the intestinal lymphatics in 40-min periods, three times before and eight times after the test meal. No significant changes in lymph volume (1.4 ± 0.2 ml/hr) or protein levels (20.2 ± 1.7 mg/hr) occurred in all four controls. Lymph flow increased to peak of 5.0-5.1 ml/hr from initial value of 1.0-1.5 ml/hr at 40-80 min after LCT feeding in 2/2 rats. Protein transport increased to 91-94 mg/hr, or approximately 136 mg more than controls, for duration of experiment. Lymph turbidity increased in LCT-fed rats. Following MCT feeding, protein transport rose, peaking at 48.7 ± 3.6 mg/hr, with a total of 72.4 mg excess protein transported in 320 min. Increase in lymph flow peaked at 3.5 ± 0.3 ml/hr, and no turbidity was noted.

3604 EFFECT OF THE LEVEL OF DIETARY PROTEIN INTAKE ON FAT ABSORPTION IN CHILDREN.

(Eng.) MacLean, W. C., Jr.; De Romana, G. L.; Graham, G. G. (Johns Hopkins Univ., 615 North Wolfe St., Baltimore, MD 21205). *Pediatr. Res.* 11(6): 774-778; 1977.

The effect on fat absorption of feeding diets providing 0%, 6.4%, or 12.5% of energy as protein was assessed in nine children aged 4-18 months. Liquid diets were prepared by high speed blending of calcium caseinate, a soy-cotton seed oil blend (80:20), sucrose, water, vitamins, and a mineral

ixture and fed p.o. five times per day. Diets
aried in the amount of protein and were fed to
aintain constant the intakes of fat and carbohy-
rate. All children began by consuming the diet
roviding 6.4% of energy as protein for a period
f 6 days: 3 days of adaptation, 3 days of metabolic
ollection of urine and stool. Successive 3-day
ietary periods and metabolic collections followed
n one of two sequences: 12.5%, 0%, 6.4% energy
s protein in five children; 0%, 12.5%, 6.4% energy
s protein in four children. Mean fat excretion
uring the two 6.4% periods did not differ signifi-
antly. Fat excretion was significantly greater
uring the period when no protein was consumed
23.9 ± 7.7% of intake) than during either the
eriod in which protein provided 6.4% of energy
$p<0.01$) or during that in which protein provided
2.5% of energy (10.0 ± 2.6% of intake, $p<0.001$).
he difference between the 6.4% and 12.5% periods
as not significant. Fecal fat, expressed as a
ercentage of fecal dry weight, was significantly
reater during periods when the diet contained no
rotein than during periods in which protein provided
ither 6.4% ($p<0.05$) or 12.5% ($p<0.01$) of energy.
dditional studies were carried out in a similar
ashion in six children consuming diets in which
rotein provided 5%, 9.6%, and 15% of energy. Fat
xcretion did not vary significantly with protein
ntake. Dietary protein facilitates the digestion
nd/or absorption of fat.

605 INTESTINAL ABSORPTION OF PHOSPHATE: ACTION
OF PROTEIN SYNTHESIS INHIBITORS AND GLUCO-
ORTICOIDS IN THE RAT. (Eng.) Ferraro, C.; Ladi-
esky, M.; Cabrejas, M.; Montoreano, R.; Mautalen,
. (Hospital de Clinicas, Catedra de Biofisica, Fac-
ltad de Medicina UNBA y Centro de Medicina Nuclear,
omision Nacional de Energia Atomica, Argentina).
. *Nutr.* 106(12):1752-1756; 1976.

he effect of actinomycin D, cycloheximide, and glu-
ocorticoids on the intestinal absorption of phos-
hate was studied in Wistar rats. The effective
ntestinal absorption of ^{32}P and ^{47}Ca was determined
imultaneously *in vivo* using a whole body counter.
ctinomycin D (1 μg/g, i.p., 13 and 6 hr before the
est) and cycloheximide (3 μg/g, i.p., 2 hr before
tudy) caused a significant diminution of the in-
estinal phosphate absorption (39.0 ± 3.4% of dose
as absorbed with actinomycin versus 55.0 ± 2.1% in
ontrols, $p<0.005$; 30.4 ± 5.7% with cycloheximide
ersus 44.5 ± 1.9% in controls, $p<0.005$). Calcium
bsorption was not altered. Experiments with the
n situ ligated loop technique were performed to
liminate the possibility that the action of the
rotein synthesis inhibitors could be due to an
ltered intestinal motility effect. Phosphate ab-
orption was also significantly diminished under
his condition. On the other hand, the administra-
ion of hydrocortisone (50 μg/g/day, i.p., 5 days)
roduced a significant inhibition of phosphate and
alcium absorption in the rat *in vivo*. The results
ndicate that proteins and/or enzymes with a rapid
urn-over are involved in the mechanism of phosphate
ntestinal absorption, and confirm previous obser-
ations that phosphate and calcium are transported
cross the intestine by different mechanisms.

3606 EFFECT OF DIETARY LACTOSE ON THE ILEAL ABSORPTION OF SODIUM TAUROCHOLATE IN THE RAT. (Fre.) Riottot, M.; Sacquet, E.; Leprince, C.; Mejean, C. (Laboratoire des Animaux sans Germes du C.N.R.S., C.N.R.Z., 78350 Jouy-en-Josas, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 284(4):309-311; 1977.

Four male Fischer rats fed a diet containing lactose showed increases in the rats of absorption of sodium taurocholate at the level of the ileum and increases in the bile acid content of the small intestine. The lactose did not, however, increase daily fecal excretion of bile acids. The authors conclude that dietary lactose increases the intestinal pool of bile acids by increasing their absorption rate in the ileum and that this effect is not due to a modification of bile acid synthesis.

3607 Na^+ TRANSPORT IN JEJUNAL CRYPT CELLS. (Eng.) Gall, D. G.; Chapman, D.; Kelly, M.; Hamilton, J. R. (Hosp. Sick Children, 555 Univ. Ave., Toronto, Ontario, Canada M5G 1X8). *Gastroenterology* 72(3):452-456; 1977.

The effect of epithelial differentiation on ion transport was examined by comparing sodium efflux from two isolated populations of cells, one from jejunal villi and the other from jejunal crypts. (Na^+-K^+)-adenosine triphosphatase (ATPase) activity was also studied. The enterocytes were isolated from Wistar rat jejunum by a dilation-vibration technique. Thymidine kinase, sucrase, and alkaline phosphatase activities were measured as markers of specific cell populations. Cells from the crypt region demonstrated lower (Na^+-K^+)-ATPase activity (7.7 ± 1.3 nmol inorganic phosphate/min/mg protein) than did cells from the villus region (22.8 ± 3.8 nmol/min/mg, $p<0.005$). The total and passive (1 mM ouabain) Na^+ efflux rate constants were also significantly lower in the crypt cells, both in sugar-free medium (7.7 ± 0.4 and 3.6 ± 0.4/hr, resp.) and in 10 mM glucose medium (8.4 ± 0.7 and 3.5 ± 0.3/hr, resp.) than in the villus cells (10.1 ± 0.2 and 6.7 ± 0.2/hr in sugar-free medium, $p<0.001$; 14.2 ± 0.4 and 6.9 ± 0.3/hr in glucose medium, $p<0.001$). The lower efflux rate constants in glucose medium demonstrated the failure of Na^+ transport to respond to an actively transported nonelectrolyte in the crypt cell population. It appears that the mechanism for coupled Na^+ and nonelectrolyte transport develops as the enterocyte differentiates and migrates onto the villus.

3608 INFLUENCE OF HYDROSTATIC PRESSURE GRADIENTS ON NET TRANSFER OF SODIUM AND WATER ACROSS ISOLATED RAT COLONIC MUCOSA. (Eng.) Wanitschke, R.; Nell, G.; Rummel, W. (I. Medizinische Universitatsklinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Naunyn-Schmiedebergs Arch. Pharmacol.* 297 (2):191-194; 1977.

The dependence of the net transfer of water and sodium on hydrostatic pressure gradients from the serosal to the mucosal side of the rat colon was investigated in everted sacs of the stripped mucosa of

Wistar rats. In the range of 3-20 cm H_2O, both the net sodium and the net water transfer were linearly dependent on hydrostatic pressure. The hydraulic permeability coefficient of the colonic epithelium was 1.1 ml/g/hr/cm H_2O. At a pressure gradient of 5.8 cm H_2O, the net movement of water from the mucosal to the serosal side ceased. Above this pressure, a net movement of water in the opposite direction occurred. The net sodium movement from the mucosal to the serosal side ceased at 11 cm H_2O. At pressures higher than 11 cm H_2O, a hypotonic fluid appeared at the mucosal side. The regression lines for the net sodium and water movement were not parallel but rather had significantly different slopes ($p<0.05$). Oxyphenisatin (10^{-5} M) increased the hydraulic permeability of the colonic epithelium. The fluid appearing on the mucosal side was isotonic. It is probable that the net flux of sodium and water from blood into the gut lumen induced by oxyphenisatin is driven by the hydrostatic pressure in the subepithelial region resulting from the capillary filtration pressure.

3609 EFFECT OF PRE-ADMINISTERED FATS AND FATTY ACIDS ON THE INTESTINAL ABSORPTION OF TRYPTOPHAN IN THE RAT. (Eng.) Inui, K.; Yamakita, H.; Hori, R. (Inst. Pharmaceutical Sciences, Hiroshima Univ. Sch. Medicine, Kasumi 1-2-3, Hiroshima, Japan). *Chem. Pharm. Bull. (Tokyo)* 24(12):3075-3080; 1976.

The absorption of L- and D-tryptophan by rat small intestine was investigated using *in situ* recirculation and *in vitro* everted sac techniques. When 1 ml of octanoic acid was administered intragastrically 3 hr previously, the absorption of L-tryptophan was greatly inhibited. Administration of trioctanoin, oleic acid, octyl alcohol, and methyl octanoate caused a moderate inhibition, but triolein and olive oil had no significant effect. In control rats, the absorption of L-tryptophan proceeded according to Michaelis-Menten kinetics. The administration of octanoic acid had little effect on the affinity of the transport mechanism for L-tryptophan, but it decreased maximal transport capacity. These results were confirmed *in vitro*. The absorption of D-tryptophan was concentration-dependent and only partially inhibited by octanoic acid. It appeared attributable to simple diffusion. Since octanoic acid increased the total amount of protein released into the perfusate, it is possible that its inhibitory effect may be due to loss of the structural and/or functional integrity of the intestinal membrane.

3610 HUMORAL REGULATION OF VITAMIN B_{12} ABSORPTION BY PREGNANT MOUSE SMALL INTESTINE. (Eng.) Brown, J.; Robertson, J.; Gallagher, N. (Royal Prince Alfred Hosp., Missenden Rd., Camperdown, 2050, Australia). *Gastroenterology* 72(5):881-885; 1977.

Pregnant Sydney White mice were fed a p.o. dose of 40 ng of $^{57}CoB_{12}$ to determine the mechanism responsible for the increased vitamin B_{12} absorption observed during pregnancy. In *in vivo* experiments, there was a progressive increase in B_{12} absorption in the third week of pregnancy. The absorptive mechanism resembled that in nonpregnant animals in that the mechanism was saturable, and presumably intrinsic factor (IF)-dependent, and that it was localized to the ileum. *In vitro* studies of IF-$^{57}CoB_{12}$ binding to ileal homogenates confirmed the requirement for IF. Studies in late pregnancy showed that IF-$^{57}CoB_{12}$ binding to ileal homogenates, expressed as nanograms of IF-$^{57}CoB_{12}$ bound/mg protein, was twice that of nonpregnant animals. When ileal homogenates were prepared from mice on days 20-21 of gestation, IF-$^{57}CoB_{12}$ binding fell to nonpregnant levels within 2-4 hr of hysterectomy. Hourly injections of serum from mice in late pregnancy, or from a woman at the 37th week of gestation, maintained IF-B_{12} binding at levels reached during pregnancy, whereas nonpregnant serum was ineffective. This fact indicates that the number of IF receptors is regulated by a humoral agent. The observation that human pregnant serum also influences B_{12} binding by mouse ileal homogenates may indicate that the human small intestine responds in a manner similar to that in the pregnant mouse.

3611 INHIBITION OF WATER ABSORPTION BY RICINOLEIC ACID. EVIDENCE AGAINST HORMONAL MEDIATION OF THE EFFECT. (Eng.) Gadacz, T. R.; Gaginella, T. S.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Am. J. Dig. Dis.* 21(10):859-862; 1976.

The mechanism by which ricinoleic acid inhibits water and electrolyte absorption was investigated in three dogs, each with a jejunal and an ileal Thiry-Vella loop. The isolated segments were perfused with isotonic electrolyte solutions (control) for 90 min. One loop was then perfused with 5 mM ricinoleic acid for an additional 90 min, while the other loop was perfused with the control solution. Loops perfused with ricinoleic acid all showed reduced fluid absorption. Perfusion of one loop with ricinoleic acid produced no changes in fluid absorption from the loop perfused with the control solution. In other experiments, 4 Ivy dog U/kg/hr of cholecystokinin produced no change in water movement in loops perfused with control solution or ricinoleic acid. The results suggest that the effect of ricinoleic acid on intestinal water transport is not mediated through the release of a circulating humoral substance.

3612 ^{65}Zn-LABELED TISSUE ZINC FOR DETERMINATION OF ENDOGENOUS FECAL ZINC EXCRETION IN GROWING RATS. (Eng.) Weigand, E.; Kirchgessner, M. (Institut fur Tierernahrung der Technischen Universitat Munchen, D-8050 Freising-Weihenstephan, W. Germany). *Nutr. Metab.* 20(5):314-320; 1976.

Experiments were carried out to ascertain whether body tissues other than plasma provide suitable endogenous zinc sources to determine endogenous fecal zinc excretion and zinc absorbability by the radioisotope dilution technique. In 16 Sprague-Dawley rats receiving 12 µCi ^{65}Zn-ZnCl$_2$, i.m., the apparent digestibility of zinc (12.8 mg Zn/kg diet dry matter) averaged 72.4 ± 6.2% during a 6-day balance period starting 9 days postinjection.

Based on the specific radioactivity of zinc in plasma after 10 days, two-thirds of the fecal zinc were of endogenous origin, and the corresponding zinc absorbability averaged about 91%. Zinc absorbabilities computed on the basis of the specific radioactivity of zinc in the small intestine, pancreas, and/or kidneys after 15 days were closely comparable to the mean derived with plasma. Other tissue examined (RBC, liver, bone, and skeletal muscle) were found to be less suitable as reflections of the specific radioactivity of endogenous fecal zinc. The pancreas, small intestine, and kidneys therefore represent useful sources of zinc for the determination of the specific activity of endogenous fecal zinc.

3613 EFFECT OF FASTING ON BODY FLUIDS AND INTESTINAL DRUG ABSORPTION IN RATS. (Eng.) Kitazawa, S.; Komuro, T. (Kyoto Univ. Hosp., Shogoin Kawahara-cho, Sakyo-ku, Kyoto, 606, Japan). *Chem. Pharm. Bull.* 25(2):327-337; 1977.

3614 CHARACTERISTICS OF INTESTINAL ABSORPTION FOLLOWING PROLONGED TOTAL PARENTERAL NUTRITION. (Eng.) Bury, K. D.; Grayston, M.; Kanarens, J. (Wellesley Hosp., Toronto, Ontario, Canada). *Surg. Forum* 26:22-24; 1975.

3615 EFFECTS OF ANTACIDS ON GASTROINTESTINAL ABSORPTION OF DRUGS. (Eng.) Romankiewicz, J. A. (New York Hosp., 525 E. 68th St., New York, NY 10021). *Primary Care* 3(3):537-550; 1976.

3616 BACK-DIFFUSION--FACT OR FICTION? (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Digestion* 15(1):53-72; 1977.

3617 DOUBLE ACTION OF CHOLERA TOXIN ON THE TRANSPORT OF ELECTROLYTES AND OF NON-ELECTROLYTES ACROSS THE DOG INTESTINAL MUCOSA. (Fre.) Robinson, J. W. L.; Mirkovitch, V.; Sepulveda, F. V.; Menge, H. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Biol. Gastroenterol. (Paris)* 9:313; 1976.

3618 NORMAL IRON ABSORPTION DETERMINED BY MEANS OF WHOLE BODY COUNTING AND RED CELL INCORPORATION OF ^{59}Fe. (Dan.) Larsen, L.; Milman, N. (Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen 0, Denmark). *Ugeskr. Laeger* 139(2):131-134; 1977.

3619 CONTROL OF IRON ABSORPTION IN PREGNANCY [Abstract]. (Eng.) Batey, R. G. (Royal Free Hosp., London, England). *Gut* 18(5):A426-A427; 1977.

3620 INTESTINAL ABSORPTION FROM THERAPEUTIC IRON DOSES. (Ger.) Werner, E.; Kaltwasser, J. P.; Ihm, P. (Zentrum der Inneren Medizin der Johann Wolfgang Goethe-Universitat, Ludwig-Rehn-Str. 14, 6000 Frankfurt/Main 70, W. Germany). *Arzneim. Forsch.* 26(11):2093-2100; 1976.

3621 RADIOACTIVE IRON UPTAKE IN THE PROXIMAL THIRD OF THE SMALL INTESTINE OF MAL-NOURISHED RATS. (Por.) Granzotti, J. A.; Iazigi, N.; Goncalves, A. L.; Faggioni, L. G. (Hospital das Clinicas, Rua Bernardino de Campos, 1000, CEP. 14100, Ribeirao Preto, SP, Brazil). *Arq. Gastroenterol.* 13(4):247-251; 1976.

3622 EFFECT OF FRACTIONS ISOLATED FROM THE HOG SMALL INTESTINE ON THE INTESTINAL ABSORPTION OF WATER AND SODIUM IN THE RAT. (Fre.) Pansu, D.; Berard, A.; Vagne, M. (INSERM U-45, Hopital Edouard-Herriot, pavillon H bis, F 69374 Lyon Cedex 2, France). *Biol. Gastroenterol. (Paris)* 9:311-312; 1976.

3623 THE EXTENT TO WHICH ETHANOL ABSORPTION IS INFLUENCED BY AN ALTERATION OF GASTRIC EMPTYING. (Ger.) Stefenelli, N.; Priessnitz, E.; Kotz, H.; Hahn, S. (Krankenhaus Krems, Hohensteinstrasse 68, A-3500 Krems, Austria). *Wien. Klin. Wochenschr.* 89(5):161-164; 1977.

3624 SHORT CHAIN FATTY ACID ABSORPTION IN THE HUMAN LARGE BOWEL [Abstract]. (Eng.) McNeil, N. I.; Cummings, J. H.; James, W. P. T. (Dunn Nutritional Lab., Cambridge, England). *Gut* 18(5):A425-A426; 1977.

See also, 3829, 3837, 3849, 3854, 3927, 4116, 4132, 4406, 4413, 4454.

3625 EFFECT OF CIMETIDINE ON THE HUMAN LOWER OESOPHAGEAL SPHINCTER. (Eng.)

Osborne, D. H.; Lennon, J.; Henderson, M.; Lidgard, G.; Creel, R.; Carter, D. C. (Edinburgh Univ., Edinburgh, Scotland). *Gut* 18(2):99-105; 1977.

Lower esophageal sphincter pressures were measured in healthy volunteers by a rapid pull-through technique during the i.v. infusion of cimetidine (100 mg/hr). No consistent or clinically important effects on sphincter pressure were observed. Serum gastrin concentrations during cimetidine infusion were measured by radioimmunoassay and showed no significant variation. In a further series of experiments, the response of the lower esophageal sphincter to the i.v. bolus injection of pentagastrin (0.5 μg/kg) was measured before and during cimetidine infusion. Cimetidine infusion had no significant effect on the sphincter response to pentagastrin.

3626 CRITICAL STUDY OF THE ELECTRICAL ACTIVITY OF THE SMALL INTESTINE IN THE DOG. (Fre.)

Perissat, J.; Saric, J.; Chemin, P.; Masson, B.; Paty, J.; Doutre, L. P. (311, boulevard du President-Wilson, 33200 Bordeaux, France). *J. Chir. (Paris)* 112(3):191-198; 1976.

Two sections of the small intestine of a sacrificed dog, the duodenojejunal angle and the ileum (proximal to the colon), were isolated and maintained by cross-circulation in the abdomen of a second dog. The electrical activity of small intestine segments was measured by enterography with electrodes placed in the intestinal serosa and on the skin of the dog's abdomen. Readings were taken during spontaneous activity of the small intestine, anoxia, endoluminal mechanical stimulation, or after i.a. or intraluminal injections of metoclopramide, metopimazine, or neostigmine. Readings from the bipolar serosal intestinal electrodes demonstrated basal electrical rhythm (BER) with a frequency of 14-16/min identical at different levels of the jejunal and ileal intestine. The frequency of BER increased (20-22/min) during anoxia or after an i.a. injection of neostigmine. Contractions registered on the graph as spikes whose number and amplitude depended on intensity. Digestive tract spasms occurred when these spikes were numerous. BER and spikes, corresponding to intestinal motor activity, were recorded in only one instance from abdominal electrodes.

3627 PATHOPHYSIOLOGY OF POSTOPERATIVE ILEUS. (Eng.)

Smith, J.; Kelly, K. A.; Weinshilboum, R. M. (Dept. Surgery, Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Arch. Surg.* 112(2):203-209; 1977.

The following hypothesis was investigated in eight female dogs: that the augmented release of norepinephrine by the sympathetic nerves in the wall of the gut in postoperative ileus inhibits the regularly occurring interdigestive motor complexes that propel contents through the gut during fasting, but the gastrointestinal pacemakers and the pattern of pacesetter potentials propagating aborally from them are not disturbed. The treatment of postoperative ileus using sympathetic blocking agents was also explored. Celiotomy, rubbing the small bowel, and exposing it to the air promptly inhibited the interdigestive myoelectric complex. Action potentials, and hence contractions, occur with gastrointestinal pacesetter potentials during fasting before the operations, but the potentials and contractions are abolished or greatly inhibited after the operations. The frequency of the gastric pacesetter potential is decreased slightly 3 hr after the operation, but the frequency of pacesetter potential in the small bowel was unchanged. All of the dogs except one tolerated the administration of phentolamine and propranolol well. A pronounced but transient increase of epinephrine and moderate but prolonged increase of norepinephrine occur in arterial plasma after the operation. The concentrations of phentolamine and propranolol used block both alpha and beta receptors in the cardiovascular system of dogs. The doses were large enough to result in the death of one dog. These data suggest that the sympathetic nervous system is involved in postoperative ileus, but other factors may also have a role.

3628 TELEMETRIC ESTIMATION OF THE DESCENDING COLON PRESSURE CHANGES ON DOGS BEFORE AND AFTER TOTAL AND SELECTIVE VAGOTOMY. (Eng.)

Garas, J.; Besbeas, S.; Vassilopoulos, D.; Pateras, H.; Ramandanis, G. (G. Papanicolaou Res. Center Oncology and Experimental Surgery, 171, Alexandra Ave., Athens 603, Greece). *Eur. Surg. Res.* 8(5):411-418; 1976.

Telemetric estimations of descending colon pressure changes in mongrel dogs of both sexes were performed both before and 6 weeks after either total or selective vagotomy in combination with Finney's pyloroplasty. Preoperative basal pressure changes in the descending colon of dogs undergoing total vagotomy plus Finney's pyloroplasty varied from 25 to 35 cm water, with the mean pressure being 29.3 cm water; postoperative basal pressure changes varied from 3 to 10 cm water, with the mean basal pressure being 6.3 cm water at 6 weeks after surgery. The 78.7% decrease in colonic basal pressure after total vagotomy was statistically significant ($p<0.005$). The mean amplitude of the colonic pressure waves dropped from a preoperative value of 21.1 cm water to 2.1 cm water after total vagotomy. The activity of the descending colon was reduced from a preoperative value of 48.1% to a postoperative value of 3.2%. The colonic motility index was also reduced from a preoperative value of 1014.9 to a postoperative value of 6.7. In dogs undergoing selective vagotomy, there were no statistically significant changes in the preoperative and postoperative values of the mean basal colonic pressure (29.5 versus 29.8 cm water), the amplitude of the colonic pressure waves (18.6 versus 17.2 cm water), the activity of the descending colon (45.7 versus 46.2%), and the colonic motility index (850.02 versus 794.64). These results might be applicable to humans since colonic innervation and physiology in dogs is essentially similar to that in humans.

3629 THE VOLUMETRIC MEASUREMENT OF GASTRIC EMPTYING AND GASTRIC SECRETION BY A RADIOISOTOPE METHOD. (Eng.) Hinder, R. A.; Horn, B. K. P.; Bremner, C. G. (Univ. Witwatersrand, Medical Sch., Essenlen St., Johannesburg 2001, South Africa). *Am. J. Dig. Dis.* 21(11):940-945; 1976.

A refinement to a previously reported method for calculating gastric emptying is presented, which allows for the dilution of gastric juice by gastric secretion, duodenal reflux, and swallowed saliva. Radioiodinated human serum albumin ($[^{125}I]$RIHSA) and the Volemetron were used to measure gastric emptying in seven adult mongrel dogs trained to accept an orogastric tube and mouth gag without agitation; one test per day per dog was performed using meals of 20 ml/kg body weight plus 12 ml additional volume of reconstituted milk. The data obtained were subjected to regression analysis, and a mathematical model for treating the data is presented. Correlation analysis of experimental points to lines of regression for gastric outflow was performed for both linear and logarithmic plotting of the volumes. The correlation coefficients were significantly different ($p<0.05$) for these two plots; the classical exponential pattern of emptying the volume of the original meal was not demonstrated; rather, emptying of the entire gastric contents was found to be linear with respect to time.

3630 LOCALIZATION OF RECEPTORS INHIBITING GASTRIC EMPTYING IN THE GUT. (Eng.) Cooke, A. R. (Univ. Kansas Medical Center, Rainbow Blvd. and 39th St., Kansas City, KS 66103). *Gastroenterology* 72(5):875-880; 1977.

Experiments were carried out to localize receptors for the inhibition of gastric emptying responsive to acid, osmotic agents, a fatty acid, and tryptophan in the first part and second to fourth parts of the duodenum, the whole duodenum, and proximal jejunum. Five dogs were prepared, each with three fistulas; one fistula was placed in the stomach, the next in the first part of the duodenum, 5 cm from the pylorus, and the third at the junction of the duodenum and the jejunum. By combinations of test meals and perfusions, either a part of or the whole of the duodenum or jejunum was tested with 550-850 mOsm solutions (glucose, glycine, mannitol, or NaCl) 100 mM HCl, 10 or 20 mM sodium oleate, and 40 mM tryptophan for their effect on gastric emptying. Phenol red was used as a nonabsorbable marker. Gastric emptying was not slowed by perfusion of the whole duodenum with the hypertonic solutions of glucose, glycine, mannitol, and NaCl, or with 10 or 20 mM sodium oleate. In contrast, significant slowing of gastric emptying occurred with jejunal perfusion of the hypertonic solutions and sodium oleate. Jejunal perfusion of 100 mM HCl slowed gastric emptying, but perfusion of the second to fourth parts of the duodenum did not. Tryptophan slowed gastric emptying when allowed to perfuse the first 5 cm of the duodenum, the second to fourth parts of the duodenum, and also the jejunum. The findings indicate that the jejunum has receptors for inhibition of gastric emptying responsive to tryptophan, acid, fat, and hypertonic solutions. In contrast, the duodenum has receptors responsive to tryptophan.

3631 OSMOLYTE AND TRYPTOPHAN RECEPTORS CONTROLLING GASTRIC EMPTYING IN THE DOG. (Eng.) Stephens, J. R.; Woolson, R. F.; Cooke, A. R. (Dept. Medicine, Univ. Iowa, Iowa City, IA 52240). *Am. J. Physiol.* 231(3):848-853; 1976.

To further define the small intestine receptors responsive to osmolytes and tryptophan, the effects on gastric emptying in dogs of three monosaccharides, three disaccharides, two dipeptides, combinations of tryptophan with two hexoses, one hexitol, and two amino acids was studied. Gastric fistulas were created in six dogs in the most dependent part of the stomach with Thomas cannulas. Studies were begun 3 weeks postoperatively and continued for 7 months. All studies were performed without anesthesia, and all dogs remained healthy. Both the disaccharides and the dipeptides were almost twice as potent per mole as their constituent monosaccharides or amino acids in their respective effects on gastric emptying, indicating that hydrolysis had occurred before the dipeptides or disaccharides had reached the osmoreceptor. This phenomenon indicates that the osmoreceptor is deep to the brush border dipeptidases and disaccharidases. The effect of tryptophan on gastric emptying was inhibited by 50 mM methionine ($p<0.05$). Methionine had no effect on a stimulant of the osmoreceptor system. Lysine, unlike methionine, does not share the neutral amino acid pathway with tryptophan and did not alter the inhibitory effect of tryptophan on gastric emptying. This indicated that tryptophan must be transported into the intestinal cell to produce its effect. The hexoses (100 mM) and mannitol (100 mM) also inhibited the tryptophan effect ($p<0.05$) probably by competition for transport into the cell, whereas nonabsorbed hexitol or mannitol were without effect. These studies point to the existence of a tryptophan receptor different from the osmoreceptor.

3632 COMPARATIVE EFFECTS OF CERULEIN AND CHOLECYSTOKININ-PANCREOZYMIN ON ELECTRIC AND MANOMETRIC ACTIVITY OF HUMAN STOMACH. (Fre.) Bortolotti, M.; Labo, G. (IIa Clinica medica generale e Terapia medica, Via Massarenti 9, I 40138 Bologna, Italy). *Rev. Fr. Gastroenterol.* (122):5-22; 1976.

The effects of cerulein (Ce) and cholecystokinin-pancreozymin (CP) on the electric and manometric activity of the gastric antrum were compared in 23 subjects. Electric activity was registered by an electrode at the end of a stomach tube and a plate on the abdominal skin. A rubber balloon connected to a manometer via a small catheter was used to measure mechanical activity. Both parameters were transduced to an amplifier on an electromyograph. Measurements were taken 20-30 min after the stomach tube had been introduced for about 65 min, during which time a 0.15 mM saline solution was given i.v. (base period), followed by the i.v. injection of Ce (0.5-12.5 mg/kg) or CP (1-8 U/kg). The delayed effects of the agents were then registered for 20 min, after which time saline was again given. Ce and CP caused a statistically significant reduction in the frequency of the basic electrical rhythm and a decrease or disappearance of spikes and manometric waves. The onset and duration of action of Ce and CP were dose-dependent. After end of treatment, the increase in spike bursts and manometric activity was still above baseline values. On a weight and a molar basis, Ce was more potent than CP.

3633 PHARMACOLOGICAL ANALYSIS OF THE EFFECTS OF METOCLOPRAMIDE ON THE GUINEA PIG ISOLATED STOMACH. (Eng.) Hay, A. M. (Royal Postgraduate Medical Sch., DuCane Rd., London W12 OHS, England). *Gastroenterology* 72(5):864-869; 1977.

A pharmacological analysis was made of the effects of metoclopramide on the contractile activity of isolated longitudinal muscle strips prepared from the guinea pig stomach. Metoclopramide (5×10^{-6} g/ml) produced up to threefold increases in the amplitude of the spontaneous contractions exhibited by such a preparation. This phenomenon was antagonized by hyoscine (1×10^{-7} g/ml) but not by tetrodotoxin (1×10^{-7} g/ml) or by hexamethonium (5×10^{-5} g/ml). The contractile response to transmural stimulation was also enhanced by metoclopramide, as was the response to extrinsic acetylcholine. Neural inhibitory systems were not affected by metoclopramide. The apparent sensitization to extrinsic acetylcholine was, however, prevented by tetrodotoxin and hexamethonium, implying that this effect depends upon ganglionic stimulation by acetylcholine. These results suggest that metoclopramide may act by increasing the amount of acetylcholine released at the postganglionic cholinergic nerve ending.

3634 THE INFLUENCE OF TEMPERATURE OF INGESTED FLUID ON STOMACH EMPTYING TIME. (Eng.) Ritschel, W. A.; Erni, W. (Univ. Cincinnati Medical Center, 401 Health Professions Building, Cincinnati, OH 45267). *Int. J. Clin. Pharmacol. Biopharm.* 15(4):172-175; 1977.

The influence of the temperature of ingested water on the stomach emptying time of solid material was studied in healthy volunteers using a telemetric pH measurement device. The time of discharge of the indigestible capsule from the stomach into the duodenum was significantly faster when administered with 250 ml of water at 5 C (15.91 ± 10.04 min) than it was with water at 20-25 C (48.18 ± 28.97 min) or at 45 C (71.42 ± 37.08 min). These observations suggest that enteric-coated preparations and drugs that are inactivated by gastric fluid or that irritate gastric mucosa should be administered only with ice water (4-6 C). Stomach washings with charcoal to remove a poison should be performed with warm water (45 C).

3635 VAGAL GASTRIC RELAXATION IN THE DOG. (Eng.) Jahnberg, T.; Abrahamsson, H.; Jansson, G.; Martinson, J. (Sahlgren's Hosp., 413 45 Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(2):221-224; 1977.

Vagal nervous control of gastric reservoir function was studied in anesthetized dogs. The administration of atropine (1.0 mg/kg) was followed by a decrease in gastric tone. Esophageal distension with a plastic balloon was followed within seconds by marked gastric relaxation. This response was still present after atropine (0.5-1.0 mg/kg) or after guanethidine (1.0 mg/kg) administration. Vagotomy increased gastric tone and abolished the gastric relaxation that normally followed esophageal distension. Efferent electrical stimulation of one peripheral vagal nerve end (voltage 5-15 V, duration 5-10 msec, frequency 5-10 sec) was accompanied by a marked gastric contraction, which was not followed by relaxation after removal of the stimulus. Atropine administration reduced or abolished this response.

3636 EFFECT OF VAGOTOMY ON THE RESPONSE OF GASTRIC MYOELECTRICAL ACTIVITY TO GLUCAGON AND FOOD. (Eng.) Stoddard, C. J.; Duthie, H. L. (Univ. Surgical Unit, Royal Infirmary, Sheffield, England). *Scand. J. Gastroenterol.* 11(42):77-83; 1976.

The effect of vagotomy on gastric myoelectrical activity was studied in 13 patients and 4 dogs. I.v. injection of glucagon (5 and 10 µg/kg) in three patients with intact vagi resulted in periods of increased frequency of gastric slow waves as well as periods of inhibition. These results persisted in seven patients after selective vagotomy, but were abolished in three patients with truncal vagotomy. Myoelectrical activity of the stomach and duodenum was measured in dogs after a meal of 450 g of meat. Coordination of spike activity superimposed on the slow waves decreased significantly after truncal vagotomy, but not after highly selective vagotomy. These results confirm that changes in myoelectrical activity are related to the extent of vagal denervation.

3637 ACTION OF CHOLECYSTOKININ AND CAERULEIN ON RABBIT SPHINCTER OF ODDI. (Eng.) Sarles, J. C.; Bidard, J. M.; Devaux, M. A.; Echinard, C.; Castagnini, A. (Centre Hospitalier, Avenue du Petit-Canedel, F-13667 Aubagne, France). *Digestion* 14(5/6):415-423; 1976.

To assess the effects of cholecystokinin (CCK) and cerulein on the rabbit sphincter of Oddi, electromyographic, manometric, and direct flow measurements were made after administration of varying doses of the hormones. Electrical activity, which can be defined as the number of spikes per burst, did not change significantly at doses of CCK from 1/16 to 1/4 IDU/kg, i.v. One-half to 8 IDU/kg led to a marked increase in sphincter activity (proportional to the logarithm of the dose) with a maximum near the first minute and a return to the basal level by the tenth minute ($p<0.05$). To determine whether the effect of CCK was due to impurities, cerulein was used in some rabbits. The sphincter response obtained with cerulein at doses between 2 and 10^{-9} g/kg was identical to the CCK-induced response. The biliary pressure-dose response to CCK paralleled the electromyographic response to CCK at identical dosages. The dose-effect curve was sigmoidal, but between 0.5 and 8 IDU/kg maximal, minimal and mean pressure increases were proportional to the log of the dose ($p<0.01$). Biliary flow was reduced proportional to the dose for 10 min following CCK administration. The mean diminution was 58% with 0.5 IDU/kg, 70% with 1-2 IDU/kg, and 77% with 4 IDU/kg. Concurrent measurements of duodenal electrical activity demonstrated that the sphincter of Oddi is functionally independent of the duodenum. Bursts of spikes of the sphincter were independent of the duodenal spikes, and biliary pressure always increased following bursts of spikes from the sphincter of Oddi. The present study shows that CCK increases the activity of the rabbit sphincter of Oddi. This effect is different from the effect of CCK on other mammals that has been described in the literature.

3638 ANTRAL DENERVATION IN PARIETAL CELL VAGOTOMIZED DOGS: EFFECT UPON GASTRIC EMPTYING AND MOTILITY, HEIDENHAIN POUCH ACID SECRETION AND SERUM GASTRIN CONCENTRATION. (Eng.) Bone, J.; Brandsborg, O.; Brandsborg, M.; Mikkelsen, K.; Amdrup, E. (Kommunehospitalet, Arhus Univ., Arhus, Denmark). *Digestion* 15(1):1-8; 1977.

To study the effect on the hormonal phase of gastric secretion, parietal cell vagotomy and side-to-side gastroduodenostomy were performed on 10 healthy adult mongrel dogs (20-30 kg), followed by antral denervation (AD) 3 weeks later. Gastric emptying rate and motility were evaluated radiologically immediately before and 3 weeks after AD. Following AD, the stomach became enlarged and atonic; "circus movement" of the duodenal loop and antral motility ceased. Mean emptying time was 126.60 ± 12.05 min before and 111.30 ± 15.02 min after AD (difference not significant). Heidenhain pouch (HP) acid secretion increased 23-202% following AD ($p\leq 0.05$); mean post-fast (18 hr) HP acid secretion also increased significantly following AD ($p<0.01$); 5-hr food-stimulated HP acid secretion increased 33-241% from 1.74 ± 0.42 mEq H^+/5 hr before to 3.57 ± 0.77 mEq H^+/5 hr after AD ($p<0.01$). No significant differences occurred in food-stimulated or fasting serum gastrin concentrations before and after AD. Factors other than gastrin must be responsible for increase in HP response to food after AD.

3639 CORRELATION BETWEEN INTESTINAL MOTILITY AND ELECTRICAL ACTIVITY. (Fre.) Eloy, R.; Lambert, A.; Le Huan, J.; Jaeck, D.; Grenier, J. F. (INSERM U-61, avenue Moliere, F 67200 Strasbourg-Hautpierre, France). *Biol. Gastroenterol. (Paris)* 9:309; 1976.

3640 A PHOTO-OPTICAL OBSERVATION OF GALLBLADDER MOTILITY IN DOGS. (Jpn.) Kudo, N. (Hirosaki Univ., Sch. Medicine, Hirosaki, Japan). *Jpn. J. Smooth Muscle Res.* 12(1):25-36; 1976.

3641 CONNECTIVE DEVICE FOR CONTINUOUS RECORDING OF MYOELECTRIC CHANGES OF THE GASTROINTESTINAL TRACT. (Ger.) Schumann, Z. (Chirurgische Universitatsklinik Erlangen-Nurnberg, Maximiliansplatz, D-8520 Erlangen, W. Germany). *Res. Exp. Med.* 169(2):93-97; 1976.

3642 LOGICAL ANALYSIS OF THE CANINE ELECTROENTEROGRAM [Abstract]. (Eng.) Wingate, D. L.; Barnett, T. G. (London Hosp. Medical Coll., London, England). *Gastroenterology* 72(5):1151; 1977.

3643 THE UPPER ESOPHAGEAL SPHINCTER (UES) IN MAN: SIGNIFICANCE OF RADIAL ASYMMETRY AND PRECISE MEASUREMENT OF CLOSURE STRENGTH [Abstract]. (Eng.) Welch, R. W.; Luckmann, K. (Univ. Texas Health Science Center, San Antonio, TX). *Gastroenterology* 72(5):1168; 1977.

3644 ELECTRICAL AND CONTRACTILE ACTIVITIES OF THE NORMAL CANINE STOMACH. (Jpn.) Kuwashima, T.; Konegawa, R.; Kuramoto, M. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Jpn. J. Smooth Muscle Res.* 12(1):1-8; 1976.

3645 EFFECT OF VARIOUS STIMULANTS ON GASTRIC MOTILITY. (Jpn.) Okita, O. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Jpn. J. Smooth Muscle Res.* 12(1):37-47; 1976.

3646 PHARMACOLOGICAL INFLUENCE ON THE GASTROINTESTINAL TRACT MOTILITY. (Ger.) Schulz, J.; Kramm, H. J.; Lisewski, G.; Schulze, E.; Reitzig, C. (I. Medizinische Klinik des Bereichs Medizin der Humboldt-Universitat, DDR-104 Berlin, Schumannstr. 20/21, E. Germany). *Dtsch. Gesundheitsw.* 31(45):2150-2152; 1976.

3647 STUDY OF THE FAT ACTION ON THE STOMACH EVACUATORY FUNCTION. (Rus.) Groisman, S. D.; Melikova, M. Yu.; Polubkov, V. A.; Khartchenko, N. M.; Begeka, S. D. (Kiev State Univ., Kiev, USSR). *Fiziol. Zh. SSSR* 62(11):1676-1683; 1976.

3648 GASTRIC MOTOR ACTIVITY AND GASTROINTESTINAL HORMONES. (Jpn.) Takeuchi, S.; Aizawa, I.; Itoh, Z. (Gunma Univ. Sch. Medicine, Japan). *Jpn. J. Gastroenterol.* 73(6):649-658; 1976.

3649 ACTION OF GASTROINTESTINAL HORMONES ON THE SPHINCTER OF ODDI IN THE RABBIT. (Fre.) Sarles, J. C.; Bidard, J. M.; Echinard, C.; Devaux, M. A. (Service C. H. U. de Chirurgie, Centre Hospitalier, avenue du Petit-Canedel, F 13677 Aubagne, France). *Biol. Gastroenterol. (Paris)* 9:317-318; 1976.

3650 RESPONSE OF THE MUSCULAR WALL OF THE GALLBLADDER TO CHOLECYSTOKININ, GASTRIN, SECRETIN, GLUCAGON AND SERUM: USE AS A BIOASSAY

FOR SERUM CHOLECYSTOKININ. (Fre.) Rey, J. F.; Howard, J. M.; Harvey, R. F.; Delmont, J. (Bristol Royal Infirmary, Bristol, England). *Biol. Gastroenterol. (Paris)* 9:324-325; 1976.

3651 ON-OFF AND GRADED MYOELECTRIC EFFECTS OF PENTAGASTRIN AND CHOLECYSTOKININ IN CANINE SMALL BOWEL [Abstract]. (Eng.) Wingate, D. L.; Thompson, H. H.; Pearce, E. A.; Dand, A. (London Hosp. Medical Coll., London, England). *Gastroenterology* 72(5):1151; 1977.

3652 EFFECTS OF NEUROTENSIN ON GUINEA PIG INTESTINAL MOTILITY [Abstract]. (Eng.) Yau, W. M.; Nemeth, P. R. (Sch. Medicine, Southern Illinois Univ., Carbondale, IL). *Gastroenterology* 72(5):1153; 1977.

3653 THE ACTION OF PARENTERALLY INTRODUCED PROTEIN HYDROLYSATES ON THE MOTOR FUNCTION OF THE STOMACH AND DUODENUM. (Rus.) Vasilevskaya, L. S.; Klimashina, T. A. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Pitan.* (5):16-20; 1976.

3654 QUANTITATIVE ANALYSIS OF THE EFFECT OF FEEDING ON CANINE INTESTINAL MYOELECTRIC ACTIVITY [Abstract]. (Eng.) Wingate, D. L.; Thompson, H. H.; Pearce, E. A.; Dand, A. (London Hosp. Medical Coll., London, England). *Gastroenterology* 72(5):1151; 1977.

3655 SOME CHARACTERISTICS OF THE MOTOR FUNCTION OF THE SMALL INTESTINE IN DUMPING SYNDROME. (Rus.) Mikhopulos, T. A.; Gubkin, V. A.; Sayenko, V. F. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (11):36-41; 1976.

3656 THE REACTIVITY OF THE SMOOTH MUSCLE TISSUE OF THE LARGE INTESTINE UNDER EXPERIMENTAL ILEUS. (Rus.) Gladki, A. P.; Bazhenov, D. V. (Dept. Histology and Embryology, Kalinin State Medical Inst., Kalinin, USSR). *Arkh. Anat. Gistol. Embriol.* 71(7):47-51; 1976.

3657 ELECTROMYOGRAPHY OF INTESTINAL MOTILITY AFTER JEJUNOILEAL BY-PASS. (Fre.) Schang, J. C.; Dauchel, J.; Hoff, M. O.; Grenier, J. F. (Pavillon Chirurgical B, Hospices de Strasbourg, F 67005 Strasbourg Cedex, France). *Biol. Gastroenterol. (Paris)* 9:319; 1976.

3658 EFFECT OF SELECTIVE PROXIMAL AND TRUNCAL VAGOTOMY ON CANINE GASTRIC ELECTRICAL ACTIVITY. (Jpn.) Yokomichi, H.; Kondo, Y.; Tanaka, T. (Univ. Tokyo Sch. Medicine, Tokyo, Japan). *Jpn. J. Smooth Muscle Res.* 12(1):15-24; 1976.

See also, 3584, 3623, 3677, 3699, 3729, 3799, 3863, 3936, 3990, 3991, 4029, 4030, 4122, 4129, 4369, 4396.

SECRETION AND METABOLISM

3659 GASTROINTESTINAL HORMONES. (Ger.) Phillip, J. (Medizinische Klinik mit Poliklinik der Universitat Erlangen-Nurnberg, W. Germany). *Med. Klin.* 71(48):2093-2102; 1976.

See also, 3956, 3612.

SECRETION AND METABOLISM

Stomach

3660 INHIBITION OF VAGALLY INDUCED GASTRIN RELEASE BY SOMATOSTATIN IN CATS. (Eng.) Uvnas-Wallensten, K.; Efendic, S.; Luft, R. (Karolinska Inst. and Hosp., Stockholm, Sweden). *Horm. Metab. Res.* 9(2):120-123; 1977.

The possibility of an inhibitory effect of somatostatin on vagally stimulated gastrin release was studied in 11 anesthetized cats. Antral gastrin release during electrical stimulation of the vagus nerve was determined in the gastric venous outflow by simultaneous recording of gastrin concentration and blood flow. Two vagal stimulations at the same frequency and duration (5 Hz for 10 min) caused similar amounts of gastrin release in the same cat; the mean gastrin output after the second stimulation was 107% of the first. The infusion of somatostatin (0.5 µg/kg/min) reduced vagally induced gastrin release to a mean level of 39% of the control value. The gastrin release induced by stimulations with 2 and 5 Hz was antagonized to a similar degree. The basal gastrin output was also reduced to about 40% of the control value during somatostatin infusion. The results may indicate a physiological role of somatostatin in the modulation of gastrin release.

3661 NEUTRAL GLYCEROGLUCOLIPIDS [sic] OF THE HUMAN GASTRIC CONTENT.

(Eng.) Slomiany, A.; Slomiany, B. (New York Medical Coll., New York, NY. 10029). *Biochem. Biophys. Res. Commun.* 76(1):115-120; 1977.

Two neutral glycolipids (A and B) were isolated from human gastric secretion using DEAE-Sephadex, silicic acid, and thin layer chromatography. Further characterization by means of gas-liquid chromatography revealed that major glyceryl ether fractions in both glycolipids were glyceryl-monohexadecyl, glyceryl-monooctadecyl, and glyceryl-monoeicososyl ether. The diglyceride portion of both A and B consisted of glyceryl-1-octadecyl, glyceryl-1-eicosyl, and glyceryl-2-hexadecyl ethers. Major fatty acids in A were docosanoate, octadecanoate, and eicosanoate, and in B, octadecanoate, eicosanoate, and hexadecanoate. The authors suggest that A is a monoalkyl-monoacyl glyceryl hexaglucoside and that B is a monalkyl-monoacyl-glyceryl octaglucoside. Glyceroglucolipids have not previously been reported in mammalian secretions.

3662 BIOSYNTHESIS OF SECRETABLE GLYCOPROTEINS OR MUCINS OF THE G.I. TRACT OF THE RAT.

(Eng.) Waldron-Edward, D.; Decaens, C.; Bader, J. P.; Robert, A. M.; Robert, L. (McGill Univ., Donner Building, Montreal, Canada). *Pathol. Biol. (Paris)* 24(8):531-536; 1976.

To study the fractions of glycoproteins, cells from rat gastric mucosal scrapings were isolated from previously secreted mucin by centrifugation (fraction I) and cultured viable cells were incubated at $^{35}Na_2SO_4$ or 5 µCi ^{14}C-1-L-fucose. Labeled mucin, synthesized and secreted during incubation, was removed by a second centrifugation (fraction II), and a subsequent pronase treatment removed tissue bound glycoprotein (fraction III). With ^{14}C-U-D-glucose at least 63% of the total incorporated radioactivity was released into fraction II as high molecular weight glycoproteins. Paper chromatography showed that, aside from labeling in galactose and hexosamine residues, the polysaccharide moiety of the secretable glycoprotein was labeled in the terminal fucose. Cells incubated in $^{35}Na_2SO_4$ incorporated 58% of the radiosulfate into secretable material, probably glycosaminoglycans, in fraction II and 21% in tissue-bound fraction III. ^{14}C-fucose was incorporated mainly into fraction II, more slowly than ^{14}C-U-D glucose. Puromycin, added to culture medium, depressed ^{14}C-U-D-glucose incorporation into fraction III, although incorporation into fraction II was unaffected. Actinomycin D also depressed incorporation into fraction III, but incorporation into fraction II was slightly stimulated. Puromycin decreased uptake of radiolabeled sulfate in fraction II by 58% and in fraction III by 44%.

3663 THE INFLUENCE OF ACETYLSALICYLIC ACID (ASPIRIN) ON GASTRIC MUCOSAL CONTENT OF ENERGY-RICH PHOSPHATE BONDS.

(Eng.) Jorgensen, T. G.; Weis-Fogh, U. S.; Olesen, H. P. (Inst. Experimental Research in Surgery, Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Clin. Lab. Invest.* 36(8):771-777; 1976.

The effect of short-term and long-term ingestion of aspirin (acetylsalicylic acid) on the morphology of the gastric mucosa and on gastric mucosal content of adenosine nucleotides was tested in 30 miniature swine. Tissue biopsies of corpus and pylorus gland areas, obtained through upper median laparotomy and gastrostomy, were evaluated for AMP, ADP, and ATP content before and after aspirin administration for 2 hr (short-term) or during a period varying from 5 to 12 weeks (long-term). In the short-term study, six groups of three to six pigs received 10 g aspirin in: 200 ml tap water (pH 3.4), 0.3 ml NaOH (pH 4.6), 0.1 N HCl (pH 1.0), or in no liquid. Adenosine phosphate was significantly ($p<0.05$) lower in aspirin-treated animals than in the controls (tap water only [pH 5.7] alone or with 0.1 N HCl), although no change occurred when aspirin was given without liquid. This decrease was greater ($0.025<p<0.05$) in pyloric gland area tissue than in corpus gland area tissue. A significant decrease in availability of high energy phosphate bonds calculated by formula (ATP + 1/2 ADP)/(ATP + ADP + AMP) occurred in pyloric gland area following ingestion of aspirin suspension at pH 1.0 (decrease 0.11, $0.01<p<0.05$), indicating the importance of an acid environment in aspirin-induced damage. In the long-term study, two pigs received 1.5 g aspirin in tablets b.i.d. for 5 weeks, two pigs received 2.5 g b.i.d. for 12 weeks, and two pigs received placebo tablets. Adenosine nucleotides decreased in all aspirin-treated pigs; corpus gland area total adenylate was lower than in placebo ($0.001<p<0.005$) and nontreated ($0.02<p<0.025$) pigs, and pyloric gland area adenylate was lower than in nontreated pigs ($0.01<p<0.02$). Gastric mucosa after 5 weeks of aspirin intake showed minor erosions and petechial bleeding and after 12 weeks, ulcerations or deep erosions penetrating the muscularis mucosa.

3664 ETHANOL-INDUCED CHANGES IN GASTRIC MUCOSAL CONTENT OF CYCLIC AMP AND ATP IN THE RAT.

(Eng.) Puurunen, J.; Hiltunen, K.; Karppanen, H. (Dept. Pharmacology, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Pharmacol.* 42(1):85-89; 1977.

The effect of gastric perfusion with a 10% ethanol solution was studied in urethane-anesthetized rats. After a 40-min perfusion, gastric acid secretion was inhibited, but 80% of the normal output was restored within 60 min after saline was substituted for the alcohol. The cyclic AMP content of the superficial mucosa, which contains most of the acid secreting parietal cells, dropped from 13.6 to 9.4 pmol/mg protein after the alcohol perfusion. The ATP content decreased from 6.9 to 5.4 pmol/mg protein. In whole mucosa, neither cyclic AMP nor ATP levels changed after ethanol perfusion. The lower values of AMP and ATP in the superficial mucosa were due to a decreased synthesis of the nucleotides, not to leakage from the parietal cells. These results suggest that ethanol-induced inhibition of gastric acid secretion may be partly due to the lowering of AMP and ATP levels in the gastric mucosa.

3665 EFFECTS OF ETHANOL ON BICARBONATE-STIMULATED ATPase, ATP, AND CYCLIC AMP IN CANINE GASTRIC MUCOSA.

(Eng.) Tague, L. L.; Shanbour, L. L. (Univ. Texas Medical Sch. Houston, Houston, TX 77025). *Proc. Soc. Exp. Biol. Med.* 154(1):37-40; 1977.

The effects of ethanol on enzymes implicated in gastric active transport (Mg^{2+}- and $Mg^{2+}HCO_3^-$ ATPases), as well as ATP and cyclic AMP, were evaluated in canine gastric mucosa. The activities of Mg^{2+}- and $Mg^{2+}HCO_3^-$-stimulated ATPases were not altered at concentrations below 10% ethanol, but were significantly inhibited (by 96%) with 15% and 20% ethanol. Tissue slice incubations with 20% ethanol showed significantly decreased ATP concentrations at 10, 20, and 30 min, $p<0.05$. Exposure of the dog gastric mucosa *in vivo* to 20% ethanol produced a significant decrease in ATP content (44%) but did not alter the cyclic AMP level. These studies suggest that the ethanol-produced decrease in gastric ATP content may be involved in the inhibition of active ion transport observed with ethanol, but that cyclic AMP is probably not involved.

3666 ACTIVATION OF RAT GASTRIC MUCOSAL ADENYLYL CYCLASE BY SECRETORY INHIBITORS.

(Eng.) Thompson, W. J.; Chang, L. K.; Rosenfeld, G. C.; Jacobson, E. D. (Univ. Texas Medical Sch., P.O. Box 20708, Houston, TX 77025). *Gastroenterology* 72(2): 251-254; 1977.

The stimulation of rat gastric mucosal adenylyl cyclase activity by three gastric secretory inhibitors (prostaglandins, secretin, and catecholamines) was studied. Prostaglandin (PG) E_1, E_2, A_1, and A_2 stimulated gastric corpus mucosal membrane adenylyl cyclase activity by 265%, 257%, 220%, and 188%, resp. PGE_1 ($K_a \approx 8$ μM) affected the maximum velocity but not the affinity of the enzyme for ATP, and maximum PGE_1 activation was not affected by histamine H_1- or H_2-receptor antagonists. 5'-Guanylyl-diphosphoimide [Gpp(NH)p], but not guanosine triphosphate, stimulated both the basal and PGE_1-stimulated adenylyl cyclase activities, although the percentage stimulation by maximal PGE was the same with or without Gpp(NH)p. NaF stimulation was also additive to that of PGE_1. Secretin also stimulated gastric mucosal adenylyl cyclase activity ($K_a \approx 30$ nM). Maximal secretin activation was not additive to that of PGE_1, suggesting a coupling to the same adenylyl cyclase catalytic site. These studies suggest that mucosal membranes may contain β-adrenergic receptors. The adenylyl cyclase activating agents used, PGE_1, secretin, and the catecholamines, are all known inhibitors of gastric acid secretion, suggesting a possible involvement of cyclic AMP in the inhibition of acid secretion in the rat stomach.

3667 LACK OF CAFFEINE STIMULATION OF GASTRIN RELEASE IN MAN.

(Eng.) Wright, L. F.; Gibson, R. G.; Hirschowitz, R. I. (Fitzsimmons U.S. Army Hosp., Denver, CO 80240). *Proc. Soc. Exp. Biol. Med.* 154(4):538-539; 1977.

Experiments were carried out in seven duodenal ulcer patients and eight normal controls to determine whether an aberration in gastrin release is responsible for the greater gastric secretory responsiveness of duodenal ulcer patients to caffeine. In two patients and two controls, gastric juice was collected for 1 hr before and the 3 hr during the infusion of caffeine benzoate (80 mg/hr for 2 hr followed by 320 mg/hr for 1 hr, i.v.); blood samples were taken before and after 1, 2, and 3 hr of infusion. All subjects had a two- to threefold dose-responsive increase in both acid and pepsin, but the serum gastrin concentration did not increase above the mean fasting level (50-65 pg/ml) in any subject. In six controls and five duodenal ulcer patients, 250 mg of caffeine was administered p.o. and blood was drawn at 0, 15, 30, 60, and 90 min. Small but significant increases of the equal magnitude in serum gastrin were seen in both groups. The results indicate that caffeine does not stimulate gastric secretion through gastrin release.

3668 GASTRIN RELEASE AND HCl SECRETION INDUCED BY ELECTRICAL VAGAL STIMULATION IN THE CAT.

(Eng.) Uvnas-Wallensten, K. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* (Suppl. 438):3-39; 1976.

The vagally-induced release of gastrin and the antral gastrin of the cat were characterized quantitatively and qualitatively and the relation of peripheral gastrin levels to HCl secretion during vagal stimulation was investigated. Vagal stimulation caused a nearly immediate increase in gastrin release (2-3 Hz). The release mechanism underwent fatigue easily (output declined after 2-3,000 impulses of 3-4 Hz had been delivered) and required 15-20 min for full recovery. The output from unilateral stimulation ranged from 7,600 to 58,000 pg gastrin. The release response to consecutive stimulation remained constant for each cat, if sufficient recovery time was allowed. The release mechanisms stimulated by the two vagi are independent of each other; when one vagus has been fatigued, stimulation of the contralateral one will cause optimal gastrin release. Bilateral stimulation produced a response twice as large as that caused by unilateral stimulation. The basal gastrin level (50,000 pg) and vagally-induced gastrin level (64,000) were about 1% of the total antral gastrin content (60 μg). There was no relation between the peripheral gastrin levels and the acid secretory responses induced by vagal stimulation. Evidence suggests that the formation of gastric juice may be linked to gastrin elimination. Clearance of gastrin was observed in the corpus during acid secretion. The clearance of gastrin from corporeal blood, in comparison to the vagally-induced gastrin secretion, was sufficient to affect significantly the peripheral gastrin levels. Due to the clearance of gastrin in the secreting mucosa, the peripheral gastrin levels do not reflect the size of the vagally-induced release of gastrin. The different molecular forms of gastrin in the antral mucosa, in plasma, and in gastric juice were investigated by gel filtration on Sephadex columns. The antral mucosa contained mainly component III, with 5% and 1% of components II and I, resp. Only components III and IV were found in cat plasma. In gastric juice, the main gastrin resembled component III, in sulfated and unsulfated forms, with small amounts of component IV. Additionally, some common features of vagal release mechanisms for gastrin, insulin, and glucagon were investigated. Atropine blocked the vagally-induced release of all three substances.

3669 EFFECTS OF ORAL CALCIUM GLUCONATE ON GASTRIC ACID SECRETION AND SERUM GASTRIN CONCENTRATION IN MAN. (Eng.) Brodie, M. J.; Ganguli, P. C.; Fine, A.; Thomson, T. J. (Stobhill General Hosp., Glasgow, G21 3UW, Scotland). *Gut* 18(2):111-114; 1977.

The effect of the ingestion of a neutral calcium salt on gastric acid production and serum gastrin concentration was studied in man. Fifteen men without gastrointestinal disease received a single p.o. dose of 4.46 mmol calcium gluconate at pH 5.6. There was a significant rise in acid output from 30-90 min after the calcium was given ($p<0.005$) compared with the basal hourly collection. The serum gastrin level 30 min after calcium administration was significantly raised ($p<0.001$), but no correlation could be demonstrated between the acid and gastrin responses. Serum calcium levels were unchanged throughout. An equimolar dose of magnesium sulfate had no such effects. This study suggests that the intragastric administration of calcium results in independent release of gastric acid and gastrin from the gastric mucosa.

3670 EFFECT OF FUNDUSECTOMY ON SERUM AND ANTRAL GASTRIN LEVELS IN RATS. (Eng.) Tatsuta, M.; Itoh, T.; Okuda, S.; Tamura, H.; Yamamura, H. (Center for Adult Diseases, Osaka, 3-3, Nakamichi 1-choma, Higashinari-ku, Osaka 537, Japan). *Gastroenterology* 72(1):78-81; 1977.

An experimental model (fundusectomy) for hypergastrinemia was established in male Wistar rats, and the mechanism of this model was investigated. Fundusectomy significantly decreased both basal gastric acid secretion (0.022 ± 0.129 mEq/4 hr versus 0.247 ± 0.043 mEq/4 hr in controls) and tetragastrin (500 μg)-stimulated secretion (0.151 ± 0.029 mEq/4 hr versus 0.464 ± 0.041 mEq/4 hr in controls). Fundusectomy significantly increased total antral gastrin (719.1 ± 153.3 ng versus 1178.4 ± 92.9 ng in controls, $p<0.001$). In addition, the fasting serum gastrin level was increased almost 3.5-fold by fundusectomy ($p<0.001$), and food-stimulated serum gastrin was increased to 517.5 ± 91.0 pg/ml, in comparison with 166.8 ± 22.0 pg/ml in controls. The rise in fasting serum gastrin was inhibited by antral acidification, suggesting that decreased acidity caused postfundusectomy hypergastrinemia. Experimental fundusectomy provides a useful experimental system for the increase of antral gastrin and for the production of hypergastrinemia.

3671 EFFECTS OF SYNTHETIC SECRETIN ON GASTRIC SECRETION IN MAN. (Eng.) Petersen, H.; Berstad, A.; Myren, J. (Ullevaal Hosp., Oslo, Norway). *Acta Hepatogastroenterol. (Stuttg.)* 23(4): 288-291; 1976.

Studies were carried out in five healthy subjects to determine if synthetic secretin stimulates gastric acid and pepsin secretion, as has been reported for natural porcine secretin. The subjects received pentagastrin (2 μg/kg hr) i.v. alone or in combination with synthetic secretin (2 U/kg hr). Secretin inhibited acid secretion by 17% and stimulated pepsin secretion by 49%. These results indicate that the effects on gastric secretion are properties of secretin itself.

3672 EVIDENCE THAT SECRETIN DOES NOT HAVE DIRECT ANTITROPHIC EFFECTS ON THE RAT STOMACH. (Eng.) Wiseman, D. A.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77030). *Proc. Soc. Exp. Biol. Med.* 153(2):277-279; 1976.

The effects of synthetic secretin on stomach weight, on biochemical characteristics of the oxyntic glandular mucosa, and on gastrin levels were studied in Sprague-Dawley rats to determine if secretin inhibits stomach growth. Twelve rats received synthetic secretin (100 U/kg) s.c. every 8 hr for 14 days. In comparison with controls, no differences in the weight of the stomach, oxyntic gland area, antrum, or oxyntic glandular mucosa were noted in the secretin-treated animals. The DNA, protein, and pepsinogen contents as well as the carbonic anhydrase activity of the oxyntic glandular mucosa were unaffected, and there were no changes in antral or serum gastrin levels. It is concluded that secretin does not have an antitrophic effect on the rat stomach and that the previously reported antitrophic effect of secretin on this tissue was due to the inhibition of pentagastrin.

3673 EFFECT OF FUNDIC DISTENSION ON GASTRIC ACID SECRETION IN MAN. (Eng.) Grotzinger, U.; Bergegardh, S.; Olbe, L. (Sahlgren's Hosp., Goteborg, Sweden). *Gut* 18(2):105-110; 1977.

The effect of distension of the fundus and body of the stomach on gastric acid secretion was studied in 26 patients with duodenal ulcer and in 6 healthy subjects. Graded distension produced by inflating a rubber balloon to volumes of 150, 300, and 600 ml resulted in significant sequential increments of acid output (mean values of 2.8, 4.4, and 5.6 mmol/15 min, resp., compared to a basal level of

1.7 mmol/15 min; $p<0.01$). The secretory response outlasted stimulation by at least 1 hr. In both groups of subjects, the highest acid output obtainable with fundic distension amounted to just above 50% of the maximum secretory response evoked by the i.v. infusion of pentagastrin. A significant correlation was found between the peak secretory rates observed during fundic distension and after pentagastrin stimulation. It is concluded that distension of the oxyntic gland area in man is a potent stimulus for gastric secretion of acid, and that patients with duodenal ulcer are no more sensitive to this stimulus than healthy subjects.

3674 FATE OF TRITIATED GASTRIN IN THE RAT AFTER TOTAL GASTRECTOMY AND AFTER ANTRUM TRANSPOSITION TO COLON. (Fre.) Gislon, J.; Millat, B.; Bonfils, S.; Girma, J. P.; Morgat, J. L.; Fromageot, P. (INSERM U-10, Hopital Bichat, 170, Boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 65(5):199-205; 1976.

To study the role of the stomach during the first phase of acid secretion after gastrin stimulation, the distribution and fate of tritiated gastrin (90 Ci/mmol) were studied in male Wistar rats (200-250 g) 2 weeks after transposition of the antrum to the colon (ACT rats) or after total gastrectomy (Gect rats). The half-life of gastrin was not affected by the surgery. The increased fundic fixation of gastrin found in ACT rats, compared to normal controls, could be due to increased parietal cell mass. Both ACT and Gect rats showed increased retention of radioactivity in the kidney. In ACT rats, this may be due to the hypersecretory activity of the fundus, leading to accelerated turnover of hormone to the kidney. In Gect rats, the lack of target organ could lead to more rapid renal catabolism of the radioactive hormone.

3675 EFFECT OF DUODENAL ACIDIFICATION ON PENTAGASTRIN-STIMULATED ACID SECRETION IN PAVLOV POUCH CATS. (Eng.) Svensson, S. O.; Emas, S. (Karolinska Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 11(Suppl. 42):55-59; 1976.

The effect of endogenous duodenal acidification on pentagastrin- and 2-deoxy-D-glucose (2DG)-stimulated acid secretion was studied in Pavlov pouch cats that also had gastric fistulae. Endogenous acidification of the duodenum was produced by closing the gastric fistula. This procedure did not alter the mean peak of 2DG-stimulated acid secretion, the mean curve of the acid response, or the time to reach the peak acid output. With the gastric fistula open, the peak pentagastrin-stimulated acid output from the Pavlov pouch occurred independently of the dose during the third to sixth 15-min periods. During infusion, acid secretion slowly declined with time both in the pouch and in the main stomach to 50-60% of the peak output at the end of the infusion. Closing the gastric fistula significantly reduced the early response to pentagastrin only at the 2 and 8 μg doses. The decline of acid secretion with
time was less pronounced than with the fistula o
Closing the fistula increased the late (11th and
12th 15-min periods) dose-response curve. It is
concluded that "physiological" amounts of HCl in
intact duodenum do not inhibit either pentagastr
or vagally stimulated acid secretion from the in
nervated oxyntic glands in conscious cats.

3676 INTRAGASTRIC TITRATION WITH EXTRAGASTR
pH-METRY--A CLINICALLY APPLICABLE AND
RELIABLE TECHNIQUE OF QUANTITATIVE ANALYSIS OF
GASTRIC SECRETION. (Ger.) Weingart, J.; Lux, G
Frimberger, E.; Ottenjann, R. (Stadtisches Krank
haus Munchen-Neuperlach, Oskar-Maria-Graf-Ring 5
D-8000 Munchen 83, W. Germany). *Med. Klin.* 72(1
497-500; 1977.

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(TIG) TO THE SIMULTANEOUS STUDY OF GAS
ACID (SA) AND PEPTIC (SP) SECRETIONS, THE GASTRI
RESPONSE (RG), AND GASTRIC EVACUATION (EG). (Fr
Rougier, P.; Mignon, M. (INSERM U-10, Hopital Bi
170, boulevard Ney, F 75877 Paris Cedex 18, Fran
Biol. Gastroenterol. (Paris) 9:302-303; 1976.

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IN DOGS. (Rus.) Kienya, A. I. (Dept.
Human and Animal Physiology, Gomel, USSR). *Vopr*
Pitan. (6):44-46; 1976.

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AND OF INTESTINAL CELLULAR RENEWAL IN
THE FASTING RAT. (Fre.) Berard, A.; Pansu, D.;
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France). *Biol. Gastroenterol. (Paris)* 9:314; 19

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GASTRIN LIBERATION IN THE DOG. (Fre.)
Vincent, G.; Carpentier, Y.; Woussen-Colle, M. C
Bremer, A.; de Graef, J. (Hopital Saint-Pierre,
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VAGUS STIMULATION ON ACID SECRETION IN
THE RAT STOMACH. (Ger.) Schramm, H.; Solch, O.
Petschner, A. (Chirurgische Universitatsklinik des Bereiches Medizin der Friedrich-Schiller-Universitat Jena, DDR-69 Jena, Bachstrasse 18, E. Germany). *Z. Exp. Chir.* 10(1):41-44; 1977.

3682 ANTRAL DISTENSION WITH ACID INHIBITS G
TRIC ACID SECRETION [Abstract]. (Eng.
Yamagishi, T.; Debas, H. T. (Faculty Medicine, U
British Columbia, Vancouver, British Columbia,
Canada). *Gastroenterology* 72(5):1152; 1977.

3683 A HISTOCHEMICAL RESEARCH OF ASPARTATE AMINOTRANSFERASE AND GLUTAMIC DEHYDROGENASE ACTIVITY IN THE STOMACH WALL. (Eng.) Martinez-Rodriguez, R.; Garcia-Segura, L. M.; Toledano, A.; Martinez-Murillo, R. (Histochemical Lab., Cajal Inst. C.S.I.C. Velazquez 144, Madrid, 6, Spain). *Ann. Histochim.* 21(4):345-351; 1976.

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3685 SECRETAGOGUE STIMULATION OF O_2 CONSUMPTION AND ^{14}C-AMINO-PYRINE (AP) UPTAKE BY ENRICHED CANINE PARIETAL CELLS [Abstract]. (Eng.) Soll, A. H. (Wadsworth Veterans Admin. Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5):1166; 1977.

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3693 REGULATION OF GASTRIN RELEASE INTO HUMAN GASTRIC JUICE [Abstract]. (Eng.) Fiddian-Green, R. G.; Knight, N.; Vinik, A. I. (Univ. Hosp., Ann Arbor, MI). *Gastroenterology* 72(5):1159; 1977.

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3695 THE ROLE OF CHOLINERGIC NERVES IN THE SECRETORY AND MOTILITY RESPONSES OF ISOLATED MAMMALIAN FUNDIC WALL TO PENTAGASTRIN [Abstract]. (Eng.) Yates, J.; Schofield, B. (Div. Medical Physiology, Univ. Calgary, Calgary, Alberta, Canada). *Gastroenterology* 72(5):1153; 1977.

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3697 GASTROINTESTINAL FACTOR(S) INHIBIT GASTRIN RELEASE FROM DOG AND HUMAN ANTRUM [Abstract]. (Eng.) Marks, J.; Schwartz, B.; Quastel, M.; Krawiec, J. (Soroka Medical Center, Beersheba, Israel). *Isr. J. Med. Sci.* 13(3):334; 1977.

3698 ACETYLSALICYLATE HYDROLASE (ESTERASE) OF FUNDIC GASTRIC MUCOSA [Abstract]. (Eng.) Spenney, J. G. (Dept. Medicine, Univ. Alabama, Birmingham, AL). *Gastroenterology* 72(5):1166; 1977.

3699 EFFECT OF SODIUM BICARBONATE ON ASPIRIN-INDUCED MORPHOLOGICAL AND POTENTIAL DIFFERENCE CHANGES IN HUMAN GASTRIC MUCOSA [Abstract]. (Eng.) Bowen, B. K. (Univ. Missouri Sch. Medicine, Columbia, MO). *Gastroenterology* 72(5):1186; 1977.

3700 INHIBITORY ACTION OF PARENTERALLY ADMINISTERED DICARBOXYLIC AMINO ACIDS ON GASTRIC SECRETION. (Rus.) Golinko, O. N.; Shlygin, G. K. (Lab. of Physiology and Pathology of Digestion, Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Pitan.* (6):31-37; 1976.

3701 SECRETORY AND TOXIC EFFECTS OF BILE IN CONTACT WITH THE ANTRAL MUCOSA IN THE CAT. (Fre.) Salmon, R.; Lehy, T.; Voillemot, N.; Dubrasquet, M. (INSERM U-10, Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 9:303-304; 1976.

3702 THE EFFECT OF GLUCOSE ON MAXIMALLY STIMULATED GASTRIC ACID SECRETION IN MAN [Abstract]. (Eng.) Davis, G.; Moore, J. G. (Dept. Medicine, Univ. Utah, Salt Lake City, UT). *Gastroenterology* 72(5):1044; 1977.

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3705 INHIBITION BY SOMATOSTATIN AND NEUROTENSIN OF THE HISTAMINE-STIMULATED GASTRIC SECRETION [Abstract]. (Eng.) Couzigou, P.; Robein, M. J.; Salmon, R.; Dubrasquet, M.; Bonfils, S. (INSERM, U-10, Hopital Bichat, 75877 Paris Cedex 18, France). *Gastroenterology* 72(5):1156; 1977.

3706 SOMATOSTATIN EFFECTS IN STRESS ULCER FORMATION OF RATS [Abstract]. (Eng.) Schwille, P. O.; Putz, F. J.; Thun, R.; Draxler, G. (Univ. Hosp., D-8520 Erlangen, W. Germany). *Eur. Surg. Res.* 9(Suppl. 1):142; 1977.

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3710 EFFECTS OF LYSOLECITHIN ON ISOLATED GASTRIC MUCOSA [Abstract]. (Eng.) Kivilaakso, E.; Fromm, D.; Silen, W. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5):1081; 1977.

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3712 ON THE MECHANISM OF ACTION PRODUCED BY PARENTERALLY INTRODUCED PROTEIN HYDROLYSATES ON GASTRIC SECRETION. (Rus.) Sysoev, Yu. A.; Sidorenko, V. I. (Inst. Nutrition, USSR Acad., Medical Sciences, Moscow, USSR). *Vopr. Pitan.* (5):20-24; 1976.

3713 FINDINGS IN GASTRIC MUCOSA AND GASTRIC SECRETION OF METHYL O-(4-HYDROXY-3-METHOXYCINNAMOYL)RESERPATE (CD-3400) AND RESERPINE DERIVATIVES ADMINISTERED SUBCUTANEOUSLY TO RATS. (Jpn.) Chiba, M.; Miyake, N.; Tamada, T.; Fujimoto, Y.; Okabe, S. (Res. Inst., Nippon Chemiphar Co., Ltd., Misato-shi, Saitama 341, Japan). *Folia Pharmacol. Jpn.* 72(8):969-978; 1976.

3714 DOUBLE-BLIND CROSSOVER STUDY OF THE EFFECT OF TRITHIOZINE (ISF 2001) ON NOCTURNAL GASTRIC SECRETION. (Ita.) Porro, G. B.; Ferrara, A.; Lazzaroni, M.; Petrillo, M.; Guidoboni, R. (Ospedale Gen. Prov., L. Sacco, Milano, Italy). *Minerva Gastroenterol.* 23(1):21-26; 1977.

3715 EFFECTS OF VITAMIN A ON THE GASTRIC RESTRAINT ULCER OF THE RAT [Abstract]. (Eng.) Cozette, P.; Laxenaire, M. C.; Benichoux, R. (Institut de Recherches Chirurgicales-CHU de Brabois, 54500 Vandoeuvre les Nancy, France). *Eur. Surg. Res.* 9(Suppl. 1):152; 1977.

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3717 HIGHLY SELECTIVE VAGOTOMY, TRUNCAL VAGOTOMY AND EXPERIMENTAL DUODENAL ULCERS [Abstract]. (Eng.) Joffe, S. N.; Bapat, R. D. (Royal Infirmary, Glasgow, G4 OSF, Scotland). *Eur. Surg. Res.* 9(Suppl. 1):147; 1977.

3718 EFFECTS OF PROXIMAL VAGOTOMY (PGV) AND TRUNCAL VAGOTOMY AND PYLOROPLASTY (TVP) ON GROWTH, GASTRIC ACID SECRETION AND SERUM GASTRIN IN PUPPIES AFTER MASSIVE ENTERECTOMY [Abstract]. (Eng.) Wolf, S. A.; Telander, R. L.; Dozois, R. R.; Go, V. L. W. (Mayo Clinic and Foundation, Rochester, MN 55901). *Gastroenterology* 72(5):1152; 1977.

3719 INFLUENCE OF TRUNCAL VAGOTOMY ON SERUM AND ANTRAL GASTRIN AND G-CELLS [Abstract]. (Eng.) Becker, H. D.; Arnold, R.; Boerger, H. W.; Creutzfeldt, C.; Schafmayer, A.; Creutzfeldt, W. (Gosslerstr. 10, D-34 Gottingen, W. Germany). *Eur. Surg. Res.* 9(Suppl. 1):150; 1977.

3720 EFFECT OF VAGOTOMY ON THE TOTAL MASS OF GASTRIN CELLS IN THE RAT STOMACH. (Fre.) Delince, P.; Nyst, M.; Willems, G.; de Graef, J. (Laboratoire de Chirurgie Experimentale L.-Deloyers, Universite Libre de Bruxelles, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9:305; 1976.

3721 THE EFFECT OF TRUNCAL VAGOTOMY ON STRESS-INDUCED LESIONS IN PIGLETS [Abstract]. (Eng.) Seufert, R. M.; Busing, M.; v. Gerstenbergk, L.; Hottenrott, C. (Chirurgische Universitatsklinik, 6900 Heidelberg im Neuenheimer Feld 110, W. Germany). *Eur. Surg. Res.* 9(Suppl. 1): 148; 1977.

3722 PROSTAGLANDIN LEVELS FOLLOWING VAGOTOMY [Abstract]. (Eng.) Saik, R. P.; Greenburg, A. G.; Peskin, G. W.; Creaghe, S. (Veterans Admin. Hosp., San Diego, CA). *Gastroenterology* 72(5):1165; 1977.

3723 FUNCTIONAL STATE OF GASTRIC MUCOSA AFTER CIRCULAR DISSECTION OF THE SEROMUSCULAR LAYER OF THE STOMACH AS VARIANTS OF SELECTIVE GASTRIC VAGOTOMY. (Rus.) Agafonov, A. A.; Vainshtein, S. G. (S. V. Kurashov Kazan' Medical Inst., Kazan', USSR). *Eksp. Khir. Anesteziol.* (5):32-34; 1976.

See also, 3584, 3588, 3592, 3593, 3594, 3599, 3616, 3623, 3629, 3636, 3638, 3658, 3689, 3706, 3740, 3745, 3858, 3865, 3893, 3894, 3936, 4067, 4068, 4073, 4074.

SECRETION AND METABOLISM

Pancreas

3724 MODIFICATION IN THE PATTERN OF THE PANCREATIC RESPONSE TO REPEATED HORMONAL STIMULATION IN THE RAT. (Fre.) Mongeau, R.; Morisset, J. (Universite de Sherbrooke, Sherbrooke, Quebec, Canada, J1K 2R1). *Gastroenterol. Clin. Biol.* 1(3):243-248; 1977.

Pancreatic protein synthesis after single and repeated hormonal stimulation of the exocrine pancreas was studied in male Sprague-Dawley rats anesthetized with urethane. Rats received single or repeated i.v. injections of a mixture of the hormones cholecystokinin-pancreozymin (8 U/kg) and secretin (10 U/kg) or isotonic solution (placebo). After sacrifice, the pancreas was incubated *in vitro*, and amylase secretion and the incorporation of ^{14}C-phenylalanine into total proteins were determined. Animals that were stimulated once showed a two- to threefold increase ($p<0.01$) in amylase secretion, whereas those with a repeat injection 15 min after the first one had a four- to fivefold ($p<0.005$) increase in amylase secretion with a simultaneous decrease in ^{14}C-phenylalanine incorporation as compared with controls. When the animals were sacrificed 30 min or more after the last injection, no significant difference between controls or test animals was noted. The results indicate that the pancreatic response to a cholinergic or hormonal stimulus is translated in the first phase by a decrease of protein synthesis concomitant to an increase of enzymatic secretion and, in a second phase, by an increase of protein synthesis at the time the secretion of enzymes has or seems to have ended.

3725 METHOD FOR DIRECT MEASUREMENT OF CHOLERESIS AND SECRETORY FUNCTION OF THE EXOCRINE PANCREAS DEMONSTRATED BY SODIUM DEHYDROCHOLATE. (Ger.) Tauschel, H. D.; Herrmann, M. (Godecke AG, Abteilung Zellbiologie, Mooswaldallee, 7800 Freiburg/Brsg., W. Germany). *Arzneim. Forsch.* 27(2b):475-480; 1977.

An experimental method is presented for direct and simultaneous measurement of choleresis and secretory function of the dog pancreas stimulated by secretin (ST) and bile secretion induced by sodium dehydrocholate (SD). Both drugs were administered to anesthetized mongrel dogs, either i.v. into the femoral vein or intraduodenal into the distal duodenal segment after ligature. The drugs were given via a canula immediately after ligature of the pylorus in trials without duodenal perfusion. The pancreas and duodenal perfusates were collected and stored at -70 C for determination of alkaline phosphatase, α-amylase, bicarbonate, total bilirubin, cholesterol, bile acids, lipase, protein, and trypsin activity. After ST, 3 U/kg i.v., a rapid steep increase and decrease of the extinction curves were noted with a similar sharp protein peak plus an increase of α-amylase and lipase activities. The bile secretion maximum was reached 6 min after ST application. The bicarbonate, protein, and enzyme activities peaked at different times. A choleretic effect was noted 3.5 min following SD, 10 mg/kg i.v. and 100 mg/kg intraduodenal, with a steep rise and fall of the extinction curve. The extinction maximum after intraduodenal application occurred later than with i.v. dosing. The absorption peaks at 280 nm UV correlated well with the protein values. Bile acids, bilirubin, and cholesterol levels also increased as did enzyme activities. All bile parameters, except bile volume, were twofold greater after intraduodenal application than after i.v. injection and returned to baseline 190 min after the former mode of application, which indicated a rapid renal clearance for ST. In conclusion, this method allows the study of kinetic problems and time-dependent reactions of choleresis, ST-induced pancreatic secretion, and SD-induced bile secretion.

3726 ETHANOL METABOLISM IN RAT PANCREAS. I. PRESENCE AND LEVEL MODIFICATIONS OF ETHANOL OXIDIZING SYSTEMS. (Fre.) Clemente, F.; Durand, S.; Laval, J.; Thouvenot, J. P.; Ribet, A. (INSERM U-151, C.H.U. Rangueil, Bat. L3, F 31400 Toulouse Cedex, France). *Gastroenterol. Clin. Biol.* 1(1): 39-48; 1977.

Ethanol (ET) oxidizing systems were studied in the pancreas of male Wistar rats given water *ad libitum* containing ET (20 mg/100 ml) for 10-12 weeks. Another group of 15 rats was treated with ET for 2 yr; only 2 controls and 3 ET-treated rats survived 2 yr. A histological study of pancreas from sacrificed ET-treated animals and controls showed little structural alterations. In homogenates of pancreas tissue, no difference between controls and ET-treated rats was seen with respect to alcohol dehydrogenase levels. Catalase, NADPH-reductase, or cytochrome oxidase activity in the pancreas did not change. Microsomal ET oxidation activity and NADPH-oxidase were not detected. In subcellular fractions of pancreatic tissue samples, cytochrome C-oxidase and succinodehydrogenase levels were significantly lower in the internal membrane of mitochondria in ET-treated animals, which was not apparent in comparison of homogenates. No signs of chronic pancreatitis were observed in three animals treated for 2 yr. Hepatocytes showed marked steatosis after prolonged treatment.

3727 ENZYME CONTENTS, ENZYME EXCRETION AND ULTRASTRUCTURE OF THE PANCREAS AFTER CHRONIC METHADONE ADMINISTRATION IN RATS. (Fre.) Roze, C.; Camilleri, J. P.; Vaille, C.; Chariot, J.; La Tour, J.; Souchard, M.; *et al.* (Hopital Bichat, 170, bd Ney, F 75877 Paris Cedex 18, France). *J. Pharmacol.* 7(4):479-490; 1976.

No significant differences in pancreas weight, DNA, RNA, total protein, amylase, and lipase contents were noted between controls and Wistar rats treated with DL-methadone (DM), 5-15 mg/kg daily, s.c., for 15-30 days. The total body weight of DM-treated animals was slightly less than controls (228 g as compared with 254 g). Concentrations of trypsin and chymotrypsinogen were significantly elevated in the pancreas of rats treated with DM. Excretion of protein and amylase increased but not as significantly as trypsinogen and chymotrypsinogen content, when enzyme levels of pancreatic secretion were measured after rats had acute pancreatic fistulas under urethane anesthesia. Enzyme concentrations of pancreatic tissue were lower in DM-treated animals after 7 hr of anesthesia than in controls. Microscopic examination of the pancreas revealed no interstitial alterations, edema, or cellular infiltrates following DM treatment. Signs of moderate hypersecretion were observed ultrastructurally. Although pancreatic stimulation due to prolonged DM treatment was expected, the role of anesthesia has yet to be elucidated.

3728 SPECIFIC REGULATION OF PANCREATIC EXOCRINE SECRETION IN MAN. (Fre.) de Kalbermatten, N.; Bambule-Dick, J.; Felber, J. P. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Biol. Gastroenterol. (Paris)* 9:325; 1976.

3729 ANTRAL CONTROL OF PANCREATICO-BILIARY FUNCTION [Abstract]. (Eng.) Debas, H. T.; Yamagishi, T. (Dept. Surgery, Univ. British Columbia, Vancouver, British Columbia, Canada). *Gastroenterology* 72(5):1045; 1977.

3730 ACTION OF ADRENERGIC SYSTEM ON EXOCRINE PANCREAS. (Fre.) Pascal, J. P.; Vaysse, N. (INSERM U-151, L3, CHU Rangueil, F 31400 Toulouse, France). *Biol. Gastroenterol. (Paris)* 9 (Suppl. 3):243-254; 1976.

3731 EFFECTS OF ALTERED CHOLINERGIC TONE TO THE SECRETIN RESPONSE TO INTRADUODENAL HCl [Abstract]. (Eng.) Kolts, B. E.; Sekine, T.; McDonald, A. P.; Snyder, S. T.; Woodward, E. R. (Dept. Medicine and Surgery, Univ. Florida, Gainesville, FL). *Gastroenterology* 72(5):1082; 1977.

3732 EFFECT OF CONSERVATIVE THERAPY ON THE ENZYME ACTIVITY AND BIOENERGY PROCESSES IN THE LIVER IN ACUTE EXPERIMENTAL PANCREATITIS. (Rus.) Kryuchok, A. G.; Chumakov, V. N.; Smelyanskaya, G. N. (Minsk Medical Inst., Minsk, USSR). *Patol. Fiziol. Eksp. Ter.* (6):29-34; 1976.

3733 DISTURBANCES OF THE MESENTERY MICROCIRCULATION IN THE SMALL INTESTINE OF ALBINO RATS IN EXPERIMENTAL ACUTE PANCREATITIS. (Rus.) Ognev, Yu. V.; Kriger, A. G. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Patol. Fiziol. Eksp. Ter.* (5):40-43; 1976.

3734 L-LEUCINE METABOLISM IN THE RAT EXOCRINE PANCREAS [Abstract]. (Fre.) Vincent, D.; Bauduin, H. (Laboratoire de Pharmacologie, Universite Libre de Bruxelles, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 9:323-324; 1976.

3735 LYMPH, BLOOD PLASMA AND URIC HYDROLASES IN ANIMALS FED DIFFERENT KINDS OF FOOD. (Rus.) Korotko, G. F.; Kovalenko, O. K. (M. I. Kalinin Andizhan Medical Inst., Andizhan, USSR). *Vopr. Pitan.* (5):29-34; 1976.

3736 ACTION OF APROTININ BY THE INTRAPERITONEAL ROUTE IN ACUTE EXPERIMENTAL PANCREATITIS IN THE RAT. (Fre.) Di Costanzo, J.; Escoffier, J. M.; Figarella, C.; Bourry, J.; Bonneau, H. P.; Gauthier, A. (Hopital Sainte-Marguerite, 270, boulevard Sainte-Marguerite, F 13274 Marseille Cedex 2, France). *Biol. Gastroenterol. (Paris)* 9:323; 1976.

3737 COMPARISON OF THE EFFECTS OF CARBAMOYLCHOLINE, PANCREOZYMIN AND SECRETIN ON LIPID METABOLISM IN THE RAT PANCREAS, INCUBATED IN THE PRESENCE OF [^{3}H]H_2O, [U-^{14}C]GLUCOSE, OR [1-^{14}C]ACETATE [Abstract]. (Eng.) Calderon, P.; Furnelle, J.; Christophe, J. (Laboratoire de Chimie et de la Nutrition, Universite Libre de Bruxelles, Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 85(2):389-390; 1977.

3738 CHOLECYSTOKININ AND SECRETIN RELEASE ARE NOT AFFECTED BY VAGOTOMY OR ATROPINE [Abstract]. (Eng.) Solomon, T. E.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5):1134; 1977.

3739 COMPARISON OF EFFECTS OF CYTOCHALASIN B, VINBLASTINE, AND DEUTERIUM OXIDE ON THE ENZYMATIC SECRETION INDUCED BY CERULEIN IN THE RAT EXOCRINE PANCREAS. (Fre.) Stock, C.; Launay, J. F.; Bauduin, H. (Laboratoire de Biochimie et de Pharmacologie, Universite Libre, Bruxelles, Belgium). *Biol. Gastroenterol.* 9:322; 1977.

3740 EFFECT OF DOPAMINE (DPM) ON HUMAN GASTRIC AND PANCREATIC SECRETION [Abstract]. (Eng.) Valenzuela, J. E.; Defilippi, C.; Diaz, G.; Navia, E.; Merino, Y. (Univ. Chile Sch. Medicine, Santiago, Chile). *Gastroenterology* 72(5):1144; 1977.

3741 ENTERIC INHIBITION OF PANCREATIC SECRETION: EVIDENCE FOR ENTERO-PANCREOTONE [Abstract]. (Eng.) Debas, H. T.; Yamagishi, T. (Dept. Surgery, Univ. British Columbia, Vancouver, British Columbia, Canada). *Gastroenterology* 72(5):1045; 1977.

3742 ACTION OF ISOPROTERENOL AND NORADRENALIN ON THE EXCRETION OF PANCREATIC ENZYMATIC PROTEINS STIMULATED BY CERULEIN, ACETYLCHOLINE AND 2-DEOXY-D-GLUCOSE IN THE RAT. (Fre.) Roze, C.; Chariot, J.; de la Tour, J.; Souchard, M.; Vaille, C.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 9:329-330; 1976.

3743 STUDY OF THE PANCREATIC SECRETORY RESPONSE TO OLEIC ACID IN THE CHRONIC ALCOHOLIC RAT. (Fre.) Laugier, R.; Sarles, H. (INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol. (Paris)* 9:328-329; 1976.

3744 CELLS WITH SOMATOSTATIN IN THE EXOCRINE PANCREAS AND THE DIGESTIVE TRACT OF THE HUMAN FETUS. (Fre.) Paulin, C.; Dubois, M. P.; Assan, R.; Chayvialle, J. A.; Dubois, P. M. (U.E.R. Medicale Lyon-Sud-Ouest, B.P. 12, F 69600 Oullins, France). *Biol. Gastroenterol. (Paris)* 9:326; 1976.

3745 POSTPRANDIAL SECRETION OF TRYPSINOGEN AND ITS GASTRIC INHIBITORY EFFECT IN THE DOG. (Fre.) Mendes de Oliveira, J. P.; Demol, P.; Singer, M. V.; Tiscornia, O. M.; Sarles, H. (INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol. (Paris)* 9:299; 1976.

3746 CARCINOMA OF THE RAT PANCREAS FOLLOWING APPLICATION OF DIMETHYLBENZANTHRACENE [Abstract]. (Eng.) Mills, L. R.; Webster, P. D.; Black, O.; Bockman, D. E. (Veterans Admin. Hosp., Augusta, GA). *Gastroenterology* 72(5):1163; 1977.

3747 ACUTE EXPERIMENTAL PANCREOPATHY: A CONTRIBUTION TO THE STUDY OF ITS PATHOGENY. THE VALUE OF TOLUIDINE BLUE IN ASSESSING THE AREAS OF NECROSIS. (Spa.) Garcia Gil, A.; Martinez Diez,

M.; Gonzalez Gonzalez, M.; Rubio Nacher, M.; Uson Gargallo, J. (Universidad de Zaragoza, Facultad de Medicina, Catedra de Patologia y Clinica Quiruricas B, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(2):155-174; 1977.

3748 PANCREATIC SECRETION IN HAMSTERS WITH PANCREATIC DUCT OBSTRUCTION [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Wong, M. F.; Carl, W. R. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5):1117; 1977.

See also, 3624, 3835, 3838, 3843, 3862, 3938, 3999, 4234, 4247.

SECRETION AND METABOLISM

Hepatobiliary Tract

3749 EXOCRINE PANCREAS UNDER EXPERIMENTAL CONDITIONS. II. IN VITRO FORMATION OF PARACRYSTALLINE STRUCTURES AND ITS FUNCTIONAL CONSEQUENCES. (Eng.) Metz, J.; Forssmann, W. G. (Inst. Anatomy, Univ. Heidelberg, Im Neuenheimer Feld 307, D-6900 Heidelberg, W. Germany). *Cell Tissue Res.* 173(2):221-235; 1976.

The different steps of the secretory process in exocrine pancreatic cells of male Wistar rats were investigated under the influence of different para-chloro-phenylalanine (pCPA)-dependent experimental conditions. Two different approaches were used. First, the effect of pCPA-pretreatment of rats, and second, the effect of varying pCPA concentrations in the incubation medium on the secretory process in untreated pancreatic lobules were studied. Formation of paracrystalline inclusions was induced *in vitro* in pancreatic lobules incubated in Krebs-Hepes-buffer (KHB) solution containing high concentrations of pCPA or even a restricted number of natural amino acids and other amino acid analogues. Every exocrine cell contained numerous paracrystalline inclusions when 1×10^{-2} M pCPA was used. Investigations with homogenates of pancreatic tissue, liver, and muscle after incubation with KHB plus 1×10^{-2} M pCPA showed paracrystals in the lumen of the endoplasmic reticulum of the pancreatic homogenates. No crystal formation was observed after incubation of liver and muscle homogenates alone. Electron microscopically, a significant degranulation of the exocrine pancreatic cells was found in the pCPA-pretreated cells during the incubation period. There was no indication that the paracrystalline structures in the endoplasmic reticulum were altered quantitatively or qualitatively in these cells. The incorporation of ^{3}H-leucine into pancreatic protein was inhibited in a dose-dependent manner, and it occurred to a greater extent after addition of pCPA to the incubation medium than was observed with pCPA-pretreated pancreatic lobules. This difference suggests that inhibition of protein synthesis is due to the presence and antagonistic effect of pCPA, although pCPA is not incorporated into proteins. It is concluded that the functional process of the exocrine pancreas is changed by pCPA both *in vitro* and *in vivo*.

3750 THE INFLUENCE OF THE POSITION OF THE OXYGEN DISSOCIATION CURVE ON OXYGEN-DEPENDENT FUNCTIONS OF THE ISOLATED PERFUSED RAT LIVER. III. STUDIES AT DIFFERENT LEVELS OF ANAEMIC HYPOXIA. (Eng.) Bakker, J. C.; Gortmaker, G. C.; De Vries-Van Rossen, A.; Offerijns, F. G. J. (Netherlands Red Cross Blood Transfusion Service, P.O. Box 9190, Amsterdam, Netherlands). *Pfluegers Arch.* 368(1/2):63-70; 1977.

The influence of a 2,3-diphosphoglycerate (DPG)-induced displacement of the oxygen dissociation curve on O_2 consumption, bile flow rate, venous pO_2, lactate/pyruvate (L/P) ratio, and β-hydroxybutyrate/acetoacetate (β-OH/Acac) ratio in rat liver at different levels of anemic hypoxia was studied. The rat livers were perfused with fresh and DPG-depleted human RBC at different hematocrit levels (30-2.5%). A decrease in oxygen supply brought about by decrease of hematocrit caused a decrease in O_2 consumption, bile flow rate, and venous pO_2, and a decrease in the L/P and β-OH/Acac ratios. The DPG content of RBC did not influence the above-mentioned parameters during severe anemic hypoxia. At O_2 supply levels between 1 and 2 ml/min/liver, venous pO_2 values were significantly higher ($p<0.01$) with the fresh than with the DPG-depleted RBC perfusates. β-OH/Acac ratios were slightly lower ($p<0.05$) with the fresh RBC perfusates at O_2 supply values of about 2.2, 1.4, and 0.9 ml/min/liver than with the DPG-depleted RBC perfusates. No differences were found in O_2 consumption, bile flow rate, or L/P ratio between fresh and DPG-depleted RBC under either normal and hypoxic conditions. These results indicate that DPG does not play a compensatory role during conditions of severe anemic hypoxia, but it may play such a role during mild anemia.

3751 SYNTHESIS AND LOCALIZATION OF α-FETO-PROTEIN IN REGENERATING MICE LIVER. (Rus.) Engelgardt, N. V.; Poltoranina, V. S.; Lazareva, M. N.; Perova, S. D.; Gleiberman, A. S. (USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 82(10):1251-1254; 1976.

The synthesis and localization of α-fetoprotein (AFP) in regenerating liver was observed after CCl_4 poisoning in male SWR mice and after partial hepatectomy in male C3NA mice, 3-4 months of age. The change in the AFP fluorescence in the liver sections was compared with AFP blood serum levels. Cells were tested for the specific antigen of the bile capillaries. In the liver sections, cells containing the AFP were found 24 hr after exposure to CCl_4. On the second day after CCl_4 poisoning, the number of hepatocytes containing the AFP and the intensity of their fluorescence sharply increased. The number of AFP hepatocytes peaked on the third day, but at no time did they represent more than 5-7% of the total hepatocyte population. AFP levels in the blood showed a parallel increase and decrease after poisoning. To exclude the possibility that AFP penetrates regenerating cells as a result of membrane damage, hepatocytes were observed for IgM immunofluorescence. The majority of the hepatocytes with AFP did not have IgM. Morphologically, AFP hepatocytes did not differ from the other hepatocytes and retained bile capillary antigen on their surface.

3752 THE EFFECT OF VAGOTOMY ON HEPATIC REGENERATION IN RATS. (Eng.) Lamar, C., Jr.; Holloway, L. S., Jr. (Veterans Admin. Hosp., 109 Bee St., Charleston, SC 29403). *Acta Hepatogastroenterol.* 24(1):7-10; 1977.

Liver regeneration was studied in male Holtzman rats that had undergone a bilateral cervical vagotomy to determine if the vagus plays a significant role in the control of hepatic regeneration. A 66% hepatectomy or a sham operation was carried out at the same time as vagotomy. Bilateral vagotomy significantly reduced the incorporation of ^3H-thymidine into liver nuclear DNA at 24 hr in comparison with controls (25,380 disintegrations per minute [DPM]/mg DNA versus 3,700 DPM/mg DNA, $p<0.01$). Ornithine decarboxylase (ODC) activity was significantly less at 4 hr after partial hepatectomy in vagotomized rats (176 versus 309 ODC U; $p<0.01$), but was similar to that in controls at 8 and 24 hr. The data suggest that the liver parenchyma receives vagal innervation and that this innervation may play a role in the control of liver regeneration.

3753 AN ^{125}I RADIOIMMUNOASSAY FOR PRIMARY CONJUGATED BILE SALTS. (Eng.) Spenney, J. G.; Johnson, B. J.; Hirschowitz, B. I.; Mihas, A. A.; Gibson, R. (Dept. Medicine, Univ. Alabama in Birmingham, Birmingham, AL). *Gastroenterology* 72(2):305-311; 1977.

The synthesis of cholylglycylhistamine and its use in the development of an ^{125}I-immunoassay for bile salts are reported. The new assay has increased antibody titers over those used in tritium-based assays from 1:500 to as much as 1:80,000, and it has reduced the complexity and expense of radioimmunoassay. The immunoassay was found to measure predominantly the conjugated bile salts since the representative estrogenic, androgenic, and adrenal steroids did not cross-react. The concentrations used were adequate to measure both physiological and pathological conditions. The sensitivity of the radioimmunoassay has been maintained, with the least detectable amount being 0.5 pmol bile salts per assay tube. Normal values for bile salts in human sera are 3.47 ± 2.16 nmol/ml. The assay is not monospecific, and the specificities depend in part on the technique used to separate the bound and free bile salt fractions. Dextran-coated charcoal is the preferred method of separating bound and free fractions, because it not only gives greater specificity, but is easier, more rapid, and more reproducible than the polyethylene glycol method. There seems to be little reason to favor a monospecific assay over one that quantitates several bile salts. As in other radioimmunoassays, it is critically important for specificities to be carefully defined. For research applications in which quantitation of single bile salts is essential, monospecific antibodies or initial purification of samples would be necessary.

3754 BILIARY REABSORPTION OF CHOLATE SODIUM, GLYCOCHOLATE SODIUM, AND TAUROCHOLATE SODIUM FROM THE RAT BILIARY TREE AFTER RETROGRADE INTRABILIARY INJECTION. (Eng.) Dammann, H. G. (I. Medizinische Universitatsklinik, Universitat Hamburg, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Klin. Wochenschr.* 54(17):845-847; 1976.

The biliary reabsorption of cholate sodium, glycocholate sodium, and taurocholate sodium was demonstrated after retrograde intrabiliary injection in rats. The percent recoveries found in the bile during the first time interval (0-2.5 min) were significantly higher in rats in which 20 nmol of the bile salts were administered in a total retrograde volume of 20 µl (57.1 ± 4.0-62.0 ± 2.2%) than in rats that received 20 nmol of the bile salts in a total retrograde volume of 40 µl (32.3 ± 2.2-39.8 ± 1.7%). When bile flow was started immediately after retrograde administration, significantly higher percent recoveries of ^{14}C-glycocholate and ^{14}C-taurocholate were found after retrograde injection (39.1 ± 2.6 and 39.8 ± 1.7%) in comparison to ^{14}C-cholate (32.3 ± 2.2%). An occlusion time of 30 sec after injection resulted in significantly reduced percent recoveries of ^{14}C-glycocholate and ^{14}C-taurocholate (30.2 ± 2.3 and 26.7 ± 1.7%) in comparison to experiments in which bile flow was started immediately. Conjugation of cholate to glycine and taurine may have some effect on the extent of biliary reabsorption of this bile acid. Biliary reabsorption appears to have an important influence on the biliary excretion of bile salts.

3755 FORMATION OF ω-MURICHOLIC ACID AND THE FECAL EXCRETION OF BILIARY ACIDS IN THE RAT.

(Fre.) Sacquet, E.; Leprince, C.; Riottot, M.; Mejean, C.; Leglise, P. (Laboratoire des Animaux sans Germes du C.N.R.S., C.N.R.S., 78350 Jouy-en-Josas, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 284 (7):557-559; 1977.

The excretion of fecal bile acids was compared in holoxenic rats and in axenic rats supplied with a modified intestinal flora by giving them bile-free holoxenic fecal material that had been heated to 70 C for 10 min. The modified axenic rats excreted more total bile acids, which consisted mainly of ω-muricholic acid and a small amount of hyodeoxycholic acid. The holoxenic rats produced less total bile acids, even though they consumed more food, and the proportions of ω-muricholic acid and hyodeoxycholic acid were reversed. These results suggest that a decrease in bacterial 7β-hydroxylases causes an increase in ω-muricholic acid, which in turn results in an increase in total bile acid fecal excretion.

3756 EFFECTS OF SINGLE INGESTION OF SEVERAL BILE ACIDS OR CHOLESTYRAMINE ON ^{14}CO$_2$ OUTPUT IN [26 ^{14}C] CHOLESTEROL-FED RATS.

(Eng.) Mathe, D.; Chevallier, F. (Laboratoire de Physiologie de la Nutrition, Universite Paris-Sud, Batiment 447, F 91405 Orsay Cedex, France). *Biochimie* 58(10):1293-1295; 1976.

The rate of cholesterol metabolism after a single p.o. dose of bile acid or cholestyramine was studied in male Wistar rats fed a diet containing 0.05% cholesterol and 30 μCi/100 g of ^{14}C-cholesterol. During days 3-5 of the experiment, the daily ^{14}CO$_2$ output was decreased 10-37% by the addition to the diet of a bile salt (sodium taurocholate, 10-80 mg; sodium glycocholate, 80 mg; cholic acid, 60 mg; sodium taurochenodeoxycholate, 80 mg; deoxycholic acid, 30 mg; hyodeoxycholic acid, 60 mg; or ursodeoxycholic acid, 60 mg). Taurocholate, cholic acid, and deoxycholic acid produced the largest decreases--32%, 35%, and 37%, resp. During the latter part of the experiment (lasting 3-8 days), ^{14}CO$_2$ production was increased.

3757 FORMATION AND INHIBITION OF LYSOLECITHIN IN HUMAN GALLBLADDER BILE.

(Eng.) Sjodahl, R.; Tagesson, C. (Dept. Surgery, Linkoping Univ., Linkoping, Sweden). *Acta Chir. Scand.* 142(5):395-399; 1976.

The phospholipase activity of homogenized human gallbladder epithelium was examined by assaying the formation of ^{14}C-lysolecithin from ^{14}C-lecithin. Incubation was carried out in diluted human gallbladder bile. The surface activity of lysolecithin was assessed in two ways: (1) by its ability to disperse liposomes containing ^{3}H-cholesterol in the lipid film and ^{14}C-glucose trapped from an aqueous solution and to alter the amounts of sedimenting and nonsedimenting isotopes and (2) by its ability to lyse RBC and to prevent pelleting of hemoglobin. The epithelial homogenate catalyzed the hydrolysis of lecithin to lysolecithin in bile. No lysolecithin was produced in the bile when the homogenate was omitted. Lysolecithin was able to lyse RBC both in isotonic (0.15 M) saline and in diluted (1:2) human gallbladder bile, but the bile contained an inhibitor of this reaction (assuming that the bile did not alter the sensitivity of the cells). In saline, no hemoglobin was pelleted (total lysis occurred) when lysolecithin exceeded 20-30 μg/ml, but in bile, the lysolecithin had to exceed 3,000-5,000 μg/ml to prevent hemoglobin from pelleting. No effect on ^{3}H-cholesterol or ^{14}C-glucose sedimentation was caused by lysolecithin at 50 μg/ml or less, but at 500 μg/ml (corresponding to 15% of the total phospholipid in the system), the amount of ^{14}C-glucose sedimenting increased markedly from about 50% to 90% and the amount of ^{3}H-cholesterol sedimenting decreased from about 60% to 50%, with a further decrease to about 15% at 5,000 μg/ml lysolecithin. The liposome bilayers are relatively stable to rather high concentrations of lysolecithin.

3758 DEGRADATION OF CHYLOMICRON REMNANT CHOLESTERYL ESTER BY RAT HEPATOCYTE MONOLAYERS. INHIBITION BY CHLOROQUINE AND COLCHICINE.

(Eng.) Floren, C. H.; Nilsson, A. (Dept. Physiological Chemistry, Univ. Lund, Lund, Sweden). *Biochem. Biophys. Res. Commun.* 74(2):520-528; 1977.

The effects of colchicine and of chloroquine on cholesteryl ester (CE) degradation were examined to test whether microtubules and lysosomal enzymes may participate in the degradative process. Rat hepatocytes in monolayer culture take up and hydrolyze the CE of isolated chylomicron remnant particles. When equal amounts of CE were added as remnant particles and as native chyle or chylomicrons, much more CE was taken up and degraded in the incubation with remnants than in the incubation with native compounds. Similar observations were made with perfused rat liver, in which uptake of remnants prepared from radioiodinated chylomicrons was shown to be much more efficient than uptake of the native chylomicrons. The structure of the intact tissue is not necessary for a selective uptake of remnants compared to uptake of native chylomicrons. This fact suggests that what occurs during the conversion of chylomicrons to remnant particles is an increase in the affinity of the lipoprotein particles for hepatocytes. It is this phenomenon in addition to a decrease in size that facilitates the filtration of particles into the space of Disse. Colchicine inhibits the hydrolysis of chylomicron remnant CE taken up by cells. The remnants might be taken up in endocytic vesicles that do not undergo fusion with primary lysosomes at a normal rate in the presence of antimicrotubular agents. Final conclusions about the mechanism of chylomicron remnant degradation *in vivo* must await further studies on the intact animal.

3759 MORPHOMETRIC STUDY OF ALCOHOL-HIGH LIPID INTAKE IN RATS.

(Fre.) Oudea, M. C.; Lostanlen, D.; Collette, M. (E.R.A. 334, U.E.R. de Medecine, 1 rue Gaston-Veil, F 44035 Nantes, France). *Biol. Gastroenterol. (Paris)* 9(2):139-146; 1976.

The effects of chronic alcohol ingestion on the ultrastructure of the rat liver were studied morphometrically and compared to changes seen in isolated hepatic mitochondria (HM). Rats were fed a high-fat diet plus ethanol; controls were given dextrine maltose instead of alcohol. At the highest dose, the amount of ethanol corresponded to 36% of the caloric intake. Stereological studies were done according to the modified method of Weibel. Alcohol-treated rats had a larger liver than the livers of control rats, and liver specimens showed moderate steatosis without giant HM. These rats had a significantly greater increase in the surface volume of the granular endoplasmic reticulum and total and mean volumes of the cell nuclei and HM. No significant difference was seen between treated and control rats with respect to HM diffusion spaces and mean diameter of the HM globules. Thus, HM changes observed *in vivo* apparently are partly due to the surrounding cellular medium.

3760 INCREASED SUSCEPTIBILITY OF HEPATIC MITOCHONDRIA TO THE TOXICITY OF ACETALDEHYDE AFTER CHRONIC ETHANOL CONSUMPTION. (Eng.)

Matsuzaki, S.; Lieber, C. S. (Mount Sinai Sch. Medicine, New York, NY 10468). *Biochem. Biophys. Res. Commun.* 75(4):1059-1065; 1977.

Liver mitochondria from rats fed ethanol chronically were studied for impairment of hepatic mitochondrial respiration and fatty acid oxidation in the presence of physiological levels of acetaldehyde (AC). Female Sprague-Dawley rat littermates were pair-fed nutritionally adequate liquid diets with 36% of the calories as ethanol or isocaloric carbohydrates for 4-6 weeks. AC was added for final concentration of 200 µM or 1 mM after hepatic mitochondria were suspended in medium of 225 mM mannitol, 75 mM sucrose, 10 mM $MgCl_2$, 0.5 mM Na EDTA, and 10 mM phosphate buffer (pH 7.4). Mitochondria from the ethanol-treated rats had significantly decreased O_2 consumption with 3.3 mM glutamate or β-hydroxybutyrate as substrate (not with 3.3 mM succinate) in the presence of either concentration of AC. O_2 consumption was depressed in mitochondria from control rats in the presence of high AC levels. O_2 consumption was measured under "state 3" conditions induced by addition of 675 nmol of ADP. Fatty acid oxidation of mitochondrial was studied by measuring CO_2 production at 37 C using 1-^{14}C-labeled palmitic and oleic acids. Rates of CO_2 production were slightly lowered in mitochondria from livers of ethanol-treated rats. AC, 200 µM, significantly depressed rates of fatty acid oxidation as measured by CO_2. This study supports the theory of a "vicious cycle" induced by chronic alcohol consumption whereby higher AC levels lead to mitochondrial injury leading to decreased capacity to metabolize AC and even further elevation of AC levels.

3761 CHANGES IN PROTEIN METABOLISM IN THE MYOCARDIUM AND LIVER OF RATS UNDER THE EFFECT OF TOXIC DOSES OF ALCOHOL. (Rus.)

Kazantseva, G. P. (Rjazansk Medical Inst., Rjazansk, USSR). *Patol. Fiziol. Eksp. Ter.* (3):62-63; 1976.

Alterations of protein metabolism in the myocardium and the liver after intragastric administration of a single toxic dose of ethanol (6 ml/kg of 96% alcohol) to 275 of male rats were investigated. Rats were sacrificed after 3, 5, 24, and 48 hr after administration of alcohol and the protein synthesis was traced with i.p. ^{35}S-methionine. The results were compared with those of a control group of rats, given the same amount of water. In both the liver and the myocardium, a decrease in uptake of ^{35}S-methionine in the mitochondria and the reduction of total protein in the myocardium was observed as early as 3 hr after ethanol administration. After 5 hr, a marked acceleration of protein synthesis was noted. By the end of the second day, protein metabolism was, on the whole, normal. The changes in protein metabolism as a result of the effect of a toxic dose of alcohol testify to a definite histotoxic influence of ethanol on the liver and myocardium.

3762 EFFECT OF A HYDROCHOLERETIC AGENT (ZANCHOL) ON STEROL METABOLISM IN RATS. (Eng.)

Raicht, R. F.; Cohen, B. I.; Eliav, B. B.; Mosbach, E. H.; Zimmon, D. S. (Manhattan Veterans Admin. Hosp., 408 First Ave., New York, NY 10010). *Gastroenterology* 72(3):507-509; 1977.

The effects of γ-oxo-γ-(8-fluoranthene)butyric acid (Zanchol) on sterol metabolism was studied in male Sprague-Dawley rats. The rats received 5-10 µCi DL-2-^{14}C-mevalonolactone, and an experimental diet containing 0.4% Zanchol was started several hr later. The animals received this diet for 14 days. The Zanchol-fed animals had significantly larger livers (15.4 g ± 2.0 versus 11.2 g ± 2.0, $p<0.025$), and electron microscopy revealed smooth endoplasmic reticulum proliferation and decreased glycogen in the liver cells. Bile cholesterol concentrations were not significantly different from those of controls. Zanchol feeding increased acidic steroid output by 71% and cholesterol synthesis by 265%. Cholesterol absorption was decreased 27%. In controls, the percentage of biliary cholic acid plus its metabolite (deoxycholic acid) was 59.5% ± 6.4. The percentage of chenodeoxycholic acid plus its metabolites was 40.5% ± 6.4. Zanchol feeding increased the percentage of cholic acid and its metabolite to 77.4% ± 7.5 ($p<0.025$), and the percentage of chenodeoxycholic acid and its metabolites was reduced to 22.6% ± 7.5. These changes were associated with the disappearance of the muricholic acids from the bile. These results suggest selective enhancement of cholic acid synthesis by stimulation of 7α-hydroxy-4-cholesten-3-one-12α hydroxylase. Zanchol markedly changes sterol metabolism in rats.

3763 THE EFFECT OF SORBITOL INFUSION ON THE COURSE OF ACUTE TOXIC HEPATITIS. (Rus.)

Abesadze, A. I.; Danielova, E. M.; Dgebuadze R. G.; Katamadze, N. G. (Inst. Hematology Tblisi, USSR). *Patol. Fiziol. Eksp. Ter.* (5):54-57; 1976.

The effect of i.v. sorbitol (10 ml/kg) on the course of acute toxic hepatitis induced by five p.o. doses of CCl_4, 0.2 mg/kg in 1/1 dilution of sunflower oil, administered over 48-hr period in 12 dogs of both sexes was studied. Two series of experiments were carried out: (1) five infusions of sorbitol simultaneously with CCl_4 (6 dogs) and (2) five infusions of sorbitol started 15 to 17 days after beginning p.o. CCl_4 (6 dogs). Separately, changes in liver function and hemostasis activity in acute toxic hepatitis were studied in seven control dogs. Simultaneous infusions of sorbitol and CCl_4 prevented development of severe hepatitis and profound and prolonged disturbances in hemostasis activity and hepatic function. Pathological changes in indices of hepatic function peaked between the 10th and 20th day after CCl_4 and sorbitol while in the control series complete restoration of these indices was not observed on the 30th day. No difference in prothrombin time was found; increase of the blood fibrinogen and unconjugated heparin was insignificant. The preventive action of sorbitol was less pronounced in the second series of experiments. Liver function was restored on the 30th day after CCl_4. The results suggest that infusions of sorbitol have significant liver detoxifying activity.

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The protective effect of the lysosomotropic detergent Triton WR-1339 was studied in male Wistar rats with CCl_4-induced hepatitis. The animals were divided into two groups: rats in group A were inoculated with Triton WR-1339 (85 mg/100 g, i.p.) 4 hr prior to the first exposure to CCl_4, and rats in group B received detergent (dose as before) 1 day after the last inhalation with CCl_4. On days 1, 3, and 7 after the last inhalation, rats were injected with ^{14}C-albumin (0.25 mg/100 g, i.v.), and 30 min later, they were sacrificed. The liver uptake of the labeled protein was significantly increased in the animals with CCl_4-induced hepatitis (5.70 ± 1.25%, compared to 1.80 ± 0.13% in intact animals). Prior inoculation with detergent (group 1) did not affect the uptake of ^{14}C-albumin (4.10 ± 0.25%), while subsequent inoculation (group B) significantly inhibited the protein uptake (1.40 ± 0.30%). The maximum concentration of ^{14}C-albumin was recorded in the lysosome fraction, which might be indicative of the selective role of the lysosomes from the Kuppfer cells in the restoration of the liver function in chronic hepatitis.

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The influence of cholecystectomy on the development of carcinoma of the colon was investigated in female NMRI mice. The incidence of colonic carcinoma induced by the s.c. injection of 1,2-dimethylhydrazine (DMH) after cholecystectomy was significantly increased; after 10 weekly injections of 15 mg/kg DMH, 70% of the animals with cholecystectomy developed carcinoma. Only 16% of the mice with similar treatment but without cholecystectomy had carcinoma. The cocarcinogenic effect of cholecystectomy may be due to the increased production of secondary bile salts by the colonic bacteria and the lack of resorptive function of the gallbladder for some carcinogenic substances passing through the liver.

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3822 Fasciola hepatica: HISTOCHEMICAL OBSERVATIONS ON JUVENILES AND ADULTS AND THE CYTOPATHOLOGICAL CHANGES INDUCED IN INFECTED MOUSE LIVER. (Eng.) Moore, M. N.; Halton, D. W. (Inst. Marine Environmental Res., 67/69 Citadel Rd., Plymouth PL1 3DH, Devon, England). *Exp. Parasitol.* 40(2):212-224; 1976.

3823 COLLAGENOLYTIC AND ELASTOLYTIC ACTIVITIES IN LIVER FROM MICE WITH SCHISTOSOMIASIS [Abstract]. (Eng.) Takahashi, S.; Dunn, M. A.; Seifter, S. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Fed. Proc.* 36(3):677; 1977.

See also, 3606, 3729, 3743, 3909, 3915, 3917, 3918, 3924, 3926, 3927, 3936, 4356, 4372.

SECRETION AND METABOLISM

Intestine

3824 DIFFERENTIATION AND AGING OF THE INTESTINAL MUCOSA OF THE RAT. I. MORPHOLOGICAL, ENZYME-HISTOCHEMICAL AND DISC ELECTROPHORETIC ASPECTS OF THE PRENATAL AND POSTNATAL DIFFERENTIATION OF THE INTESTINAL MUCOSA. (Eng.) Hohn, P.; Schafer, A.; Gabbert, H. (Pathological Inst., Johannes Gutenberg Univ., Mainz, W. Germany). *Mech. Ageing Dev.* 6(1): 35-51; 1977.

Morphological and enzymatic properties of the mucosa of the small and large intestine of the rat were studied from the fetal to the adult stage in order to delineate phases of maturation and aging in the intestine. Electron microscopic, histochemical, and electrophoretic analyses were done for four phosphatases and seven dehydrogenases. The study showed that enzymatic changes occurred synchronously with morphological differentiation, and that development could be described in four stages; (1) the 19th to the 21st fetal day is a period of increasing enzyme activity in the enterocytes and formation of giant lysosomes in the ileal epithelium; (2) during the first 2 weeks of life, the lysosomes complete their development, but enzymatic activity remains nearly the same as on day 21; (3) during the first half of the third week of life, various qualitative and quantitative enzyme changes take place, in addition to the development of an epithelial population in the ileum that lacks lysosomes; (4) and development of the intestine is completed by the middle of the fourth week, as the adult stage is reached.

3825 EFFECT OF BISACODYL ON THE STRUCTURE AND FUNCTION OF RODENT AND HUMAN INTESTINE. (Eng.) Saunders, D. R.; Sillery, J.; Rachmilewitz, D.; Rubin, C. E.; Tytgat, G. N. (Dept. Medicine RG-20, Univ. Washington, Seattle, WA 98195). *Gastroenterology* 72(5):849-856; 1977.

The effect of bisacodyl on intestinal structure and function was investigated in male Sprague-Dawley rats and in humans. Net water transport was measured under steady state conditions *in vivo* during single pass infusions of intestinal segments. Each segment served as its own control. Bisacodyl inhibited water absorption in rat jejunum, ileum, and colon. The degree of inhibition was linearly related to the logarithm of the bisacodyl concentration over the range 0.05-2.0 mg/100 ml. In human jejunal segments, bisacodyl (1 mg/100 ml) caused net water secretion. Bisacodyl (5 mg every 6 hr, p.o.) increased ileostomy output by 15% in five patients with established ileostomies. By light microscopy, bisacodyl (2 mg/100 ml) erased cytoplasmic and nuclear detail within surface absorptive cells of rat intestine. By electron microscopy, the involved cells contained sparse and abnormal cytoplasmic organelles and chromatin-deficient nuclei. These results suggest that the laxative effect of bisacodyl is related to its ability to inhibit intestinal water absorption. Reduced absorption may be secondary to changes in surface absorptive cells.

3826 CELL KINETICS IN THE SMALL INTESTINE OF SUCKLING RATS. I. INFLUENCE OF HYPOPHYSECTOMY. (Eng.) Yeh, K. Y. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Anat. Rec.* 188(1):69-76; 1977.

Cell kinetics were examined in the duodena of intact Wistar NLR rats at 6, 16, and 22 days of age, and of hypophysectomized rats at 22 days. In intact rats, the crypt population per villus increased over 10-fold, the greater part of the increase occurring late in the third week. The labeling index did not differ between 6 (28.3%) and 16 (27.6%) days, but increased to 37.8% at 22 days. Generation time did not differ between 6 (18.0 hr) and 16 (17.7 hr) days, but fell to 10.8 hr at 22 days by shortening of both the presynthetic and synthetic phases. Acceleration of cell migration rate between 18 and 19 days of age resulted in shortening of cell transit time from 7 days in rats younger than 18 days to 2 days in those older than 18 days. When rats were hypophysectomized at 6 days, the duodenal crypt population per villus at 22 days was comparable to that of intact rats at 16 days. The labeling index at 22 days was 19% lower than that of intact rats at 6 days. Generation time at 22 days was slightly shortened by a decrease of the presynthetic phase, but the duration of 15.5 hr was 43% longer than in intact rats at the same age. Despite the small crypt population and the low cell production rate, the cell transit time in 22-day-old hypophysectomized animals is only 3 days.

3827 ULTRASTRUCTURAL FEATURES OF REGIONAL DIFFERENCES IN CHYLOMICRON SECRETION BY RAT INTESTINE. (Eng.) Sabesin, S. M.; Clark, S. B.; Holt, P. R. (Univ. Tennessee Coll. Medicine, Memphis, TN 38163). *Exp. Mol. Pathol.* 26(2):277-289; 1977.

The effects of prolonged intraduodenal triolein perfusion on intestinal fat absorption were studied in the rat small intestine to investigate the ultrastructural features of regional differences in chylomicron secretory capacity. Using conditions in which intraluminal triolein concentrations were high enough to saturate the mechanism for fat uptake, the proximal segments reached a steady state of uptake and chylomicron secretion within 1 hr, whereas triglycerides accumulated progressively in the distal epithelial cells. After 1 or 4 hr of perfusion with [1-^{14}C]triolein, the mucosal triglyceride content was much greater in distal than in proximal segments (43.8 versus 67.6 mEq fatty acid/g wet weight at 1 hr; 55.0 versus 203.5 mEq/g at 4 hr), and electron microscopy disclosed many more and larger intracellular fat droplets in the distal absorptive cells. Six hours after stopping the 4-hr perfusion, many distal cells were still filled with large fat droplets, whereas the proximal cells were devoid of fat. In comparison to proximal intestine, triglycerides accumulated in distal segments following direct segmental triolein perfusion, and electron microscopy disclosed large intracellular fat droplets similar to those observed after intraduodenal triolein perfusion. The ultrastructural observations suggest that fat accumulation, in the distal segments, is due to a relatively decreased capacity for chylomicron release. These studies suggest an intrinsic difference between proximal and distal intestine in fat absorption, which may reflect regional differences in cellular function such as membrane availability for the final assembly and secretion of chylomicrons.

3828 EFFECT OF NEPHRECTOMY AND ENTERECTOMY ON PLASMA CLEARANCE OF INTRAVENOUSLY ADMINISTERED DIPEPTIDES IN RATS. (Eng.) Adibi, S. A.; Krzysik, B. A. (Gastrointestinal and Nutrition Unit, Montefiore Hosp., Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *Clin. Sci. Mol. Med.* 52(2): 205-213; 1977.

The plasma clearance of i.v. administered dipeptides was studied in bilaterally nephrectomized, enterectomized, and sham-operated rats. During the first 5 min after their introduction, plasma levels of glycyl-L-leucine (GL) and glycylglycine (GG) were higher in nephrectomized than in control rats, but there were no significant differences thereafter. Glycylsarcosine (GS) clearance was impeded after nephrectomy, and its half-life in the plasma was prolonged from 7.6 to 52.0 min. GL and GG were not found in the tissues of sham-operated rats (muscle, liver, intestinal mucosa, and renal cortex), but GS was found in all four tissues. GG was found in the muscle, liver, and mucosa of nephrectomized rats, but GL was present in muscle only. Enterectomy did not affect the half-life of GG in plasma, but allowed its accumulation in the renal cortex, muscle, and liver. It is concluded that the kidneys and intestine are important but not essential in the plasma clearance of easily hydrolyzed dipeptides. Clearance of dipeptides that are poorly hydrolyzed by body tissues, such as GS, appears to be performed in the kidneys only.

3829 EFFECTS OF VARIOUS CARBOHYDRATES ON THE ACTIVITY OF ENZYMES IN THE BRUSH BORDERS OF THE JEJUNAL MUCOSA. INCREASED PHOSPHATASE ACTIVITY. (Fre.) Dupuis, Y.; Fournier, A.; Fournier, P. (Metabolisme mineral des Mammiferes [E.P.H.E.], Faculte de Pharmacie, 92290 Chatenay-Malabry, Paris, France). *C. R. Soc. Biol. (Paris)* 170(4):739-744; 1976.

The effects of sorbitol (SB: 200 mM) or disodium hydrogen phosphate (DHP: 50 mM) on enzyme activities in the brush borders of the rat jejunum were studied. Jejunal mucosa was obtained surgically from anesthetized rats, treated with butanol and then centrifuged. SB exerted only a slight effect on glycosidase activity, whereas DHP induced marked but moderate activity. SB had no effect on aminopeptidase activity; the effect of DHP on this enzyme could not be ascertained. SB increased alkaline phosphatase activity markedly, but DP reduced it significantly. In another experiment in which aqueous mucosal extracts were prepared in tris buffer and treated with butanol, a significant increase in phosphatase activity was also induced by mannitol, dulcitol, inositol, D-glucose, D-xylose, L-arabinose, lactose, and raffinose. The effect of SB and DHB on the phosphatase activity in rat jejunum was similar to that observed in Ca absorption.

3830 ABSORPTION AND METABOLISM OF FRUCTOSE IN THE SMALL INTESTINE OF CONVENTIONAL AND GERM-FREE PIGLETS IN VITRO. (Eng.) Talafantova, M.; Kolinska, J. (Inst. Microbiology, Novy Hradek, Praha 4, Czechoslovakia). *Folia Biol. (Praha)* 23(1):76-80; 1977.

The uptake and metabolism of D-fructose was studied in jejunal loops from conventional and germ-free piglets during their development. The intracellular fructose concentration after a 30-min incubation with 1 mM fructose was highest (although not exceeding the concentration of fructose in the incubation medium) in the intestine of the newborn pig, in comparison with the concentration in 1-, 2-, 3-, 7-, 8-, and 13-day-old pigs. With increasing age, a decline in intracellular fructose concentration was found, the sharpest decrease being observed between 0 and 2 days of age. The main metabolic product of fructose was lactic acid. Lactate production from endogenous sources within the small intestine was highest in the intestinal loops from the newborn conventional pigs, while lactate production in the germ-free pigs increased with increasing age, following the drop between 0 and 2 days of age.

3831 JEJUNAL SUCRASE IN RATS: TYPES OF RESPONSE TO STIMULATION WITH SUCROSE. (Por.) Soares, F. C.; Collares, E. F.; do Rosario, M.; Brasil, L. (Hospital das Clinicas, Rua Bernardino de Campos, 1000, 14100 Ribeirao Preto, Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(2):89-96; 1976.

The specific activity of sucrase was measured in three different segments of rat jejunum following direct and indirect stimulus with 70% dietary sucrose. Adult male Wistar rats, stabilized on standard diets for 7 days, were divided into six groups (11/group); one group was sacrificed immediately, while the remaining groups were fasted for 24 hr. A 10-cm segment of small intestine was then excised and joined at both ends to the abdominal wall. The intestine was repaired by end-to-end anastomosis, and the isolated segment remained inside the abdominal cavity. Surgery was followed by a 72-hr fast and then a 24- or 72-hr diet with or without sucrose; all rats consumed about 12 g of food/day. One group was sacrificed immediately after the fast period. Sucrase activity was determined in homogenized tissues, including the isolated segment, and in the two 10-cm segments on either side of the anastomosis. The 24-hr sucrose stimulus produced a rise in sucrase activity in one intact segment over activity in the isolated segment. All three segments showed rises in sucrase activity after 72-hr sucrose. The delayed response of the enzyme in the isolated segment, which occurred despite lack of direct exposure to sucrose, is not understood; it may be related to cell migration and may be under hormonal or nervous system control. Fasted rats and those receiving diet without sucrose showed similar levels of sucrase activity.

3832 INHIBITION OF INTESTINAL GLUCAGON-LIKE IMMUNOREACTIVITY (GLI) SECRETION BY SOMATOSTATIN IN MAN.

(Eng.) Marco, J.; Hedo, J. A.; Villanueva, M. L. (Clinica Puerta de Hierro, Universidad Autonoma de Madrid, San Martin de Porres 4, Madrid 35, Spain). *J. Clin. Endocrinol. Metab.* 44(4):695-698; 1977.

To investigate the influence of somatostatin on intestinal glucagon-like immunoreactivity (GLI) secretion, the GLI secretion in response to p.o. glucose was determined in six gastrectomized men during an i.v. somatostatin infusion. Sixty minutes after the start of a somatostatin (9 μg/min following the injection of a 250 μg bolus dose) or saline infusion, GLI secretion was stimulated with glucose (1.75 μg/kg, 25% solution). Glucose stimulated a 340% and a 150% elevation in circulating GLI, using antisera 78J and R-8, resp. Somatostatin did not modify fasting GLI concentrations but completely abolished the GLI response to glucose ingestion, and termination of the somatostatin infusion was followed by a rapid and significant increase in plasma GLI levels. The inhibitory effect of somatostatin on beta cell function was evidenced by a slight reduction from basal insulin levels (-2 μU/ml, $p<0.01$) and by the absence of insulin response to glucose; a dramatic insulin rebound occurred upon somatostatin withdrawal. Somatostatin also lowered fasting glycemia (-23 mg% at 0 min, $p<0.001$); during its infusion, the elevation of blood sugar after p.o. glucose was delayed. The data demonstrate that somatostatin inhibits GLI secretion in man, and that it retards glucose absorption.

3833 POTASSIUM SECRETION BY COLONIC MUCOSAL CELLS AFTER POTASSIUM ADAPTATION.

(Eng.) Fisher, K. A.; Binder, H. J.; Hayslett, J. P. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Am. J. Physiol.* 231(4):987-994; 1976.

Studies of fluid and electrolyte movement, potential difference, and Na-K-ATPase activity were performed in rat colon and jejunum. Male Sprague-Dawley rats fed 2.6 mEq K/gm diet for 7 days were compared to a control group fed 0.13 mEq K/gm. A marked increase in both urinary (27.2 ± 1.54 mEq/24 hr, $p<0.001$) and fecal (0.42 ± 0.05, $p<0.001$) excretion of potassium was reported. In the colon, chronic potassium loading increased potassium secretion from 0.8 ± 0.2 to 3.9 ± 0.9 μEq/min/g tissue $p<0.01$) and increased the potential difference from 27 ± 5.0 to 54 ± 2.6 mV ($p<0.001$), lumen negative, as Na-K-ATPase activity increased in homogenates from 5.0 ± 0.5 to 11.4 ± 1.0 μM Pi/mg protein/hr ($p<0.001$). The 5'-nucleotidase activity was not affected. In contrast, there was no change in potential difference, potassium movement or Na-K-ATPase activity in the jejunum of potassium-loaded rats. Colonic movement of water, sodium, and chloride was similar in the control and potassium-loaded rats. Electrical resistance and ^{3}H-inulin clearance did not change in potassium-loaded rat colon. Adrenalectomy significantly ($p<0.05$) decreased the Na-K-ATPase activity, the potential difference (12.8 ± 1.2 mV compared to the control value of 26.3 ± 5.0 mV), and the potassium secretion in animals maintained on a normal intake of potassium. However, increased dietary intake of potassium significantly increased Na-K-ATPase activity and potential difference in adrenalectomized animals. It is suggested that the colon shares with the mammalian distal tubules of the kidney the capacity to adjust potassium transport to meet metabolic needs. Na-K-ATPase may be important in transepithelial potassium movement.

3834 THE EFFECT OF MICROFLORA ON THE INTESTINAL METABOLISM OF L-THREONINE IN RATS.

(Fre.) Combe, E.; Debras, E. (Laboratoire d'Etude du Metabolisme azote, I.N.R.A., Theix, 63110-Beaumont, France). *C. R. Soc. Biol. (Paris)* 170(2):368-374; 1976.

The effect of microflora on the intestinal metabolism of L-threonine (Th) was studied in holoxenic and axenic Wistar CR rats. Two hours after injection of 10 μCi ^{14}C-Th, i.p., blood samples were taken from the aorta, stomach, and small intestine of anesthetized rats. The cecum and large intestine were frozen. Radioactivity (RA) was determined by liquid scintillation spectrometry. The mean amount of RA expired in the CO_2 of both groups of rats did not differ. However, RA was raised significantly in the digestive tract of axenic animals compared with holoxenic animals. RA was highest in the small intestine and lowest in the cecum and large intestine of holoxenic rats, where the microflora synthesized its own proteins from labeled digestive material. Trichloroacetic acid-soluble tissue from holoxenic rats showed that the free labeled Th level was greater than that of amine and nonamine compounds. However, in axenic rats the activity of the latter compounds in the digestive contents was greater than that of free Th.

3835 DEMONSTRATION OF A VITAMIN B_{12} BINDER IN PANCREATIC JUICE: EFFECT ON THE INTESTINAL UPTAKE OF VITAMIN B_{12}.

(Eng.) Von der Lippe, G.; Andersen, K. J.; Schjonsby, H. (Univ. Bergen, Haukeland Sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11:807-812; 1976.

Studies were conducted to determine whether a vitamin B_{12}-binding principle was present in human and rat pancreatic juices, and to study the influence of this binder on intestinal uptake of vitamin B_{12}. Determination of vitamin B_{12}-binding capacity and the gel filtration of human and rat pancreatic juices demonstrated a vitamin B_{12} binder different from gastric intrinsic factor (IF). Unsaturated

B_{12}-binding capacity was also demonstrated in the gastric mucosa of the rat and in saliva, bile, gastric juice, and duodenal juice from patients (1 with duodenal ulcer, 2 with chronic alcoholism, and 1 with chronic pancreatitis). In the presence of human IF antibody, the B_{12}-binding capacity of rat and human pancreatic juices was unchanged, whereas, the B_{12}-binding capacity of rat gastric mucosa extract and of human gastric juice markedly decreased. There was a small decrease in the B_{12}-binding capacity of bile, saliva, and duodenal juice in the presence of human IF antibody. The presence of vitamin B_{12} binders in rat pancreatic juice and human pancreatic and duodenal juices was confirmed by gel filtration. Vitamin B_{12} binders in human and rat pancreatic juices had no effect on the intestinal uptake of $^{57}CoB_{12}$ bound to IF *in vivo* and *in vitro*. This fact suggests that under the experimental conditions the pancreatic vitamin B_{12} binder does not influence the intestinal uptake of vitamin B_{12}.

3836 JEJUNOILEAL BYPASS IN THE TREATMENT OF RATS WITH EXPERIMENTAL OBESITY. COMMUNICATION II: LONG-TERM EVOLUTION OF SOME BIOHUMORAL PARAMETERS. (Ita.) Armellini, F.; Belligoli, A. M.; Bosello, O.; Faccioli, G.; Baggio, E.; Ottolenghi, A. (Istituto di Clinica Medica Generale e Terapia Medica, Universita di Padova, Padova, Italy). *Chir. Patol. Sper.* 24(2):111-118; 1976.

3837 CONSEQUENCES OF THE DESTRUCTION OF THE VILLUS EPITHELIUM BY ISCHAEMIA OR TRITON X-100 [Abstract]. (Eng.) Robinson, J. W. L.; Mirkovitch, V.; Menge, H. (Centre Hospitalier Universitaire Vaudois, CH-1011 Lausanne, Switzerland). *Gut* 18(5):A425; 1977.

3838 SECRETORY ACTIVITY OF THE SMALL INTESTINE AFTER PANCREATIC RESECTION. (Rus.) Mukaramov, A. M. (Dept. Normal and Topographic Anatomy, N. A. Semashko Moscow Medical Inst. Stomatology, Moscow, USSR). *Vestn. Khir.* 117(10):49-51; 1976.

3839 CHARACTERISTICS OF RABBIT SMALL INTESTINE IN ORGAN CULTURE: BASAL AND PENTAGASTRIN TREATED [Abstract]. (Eng.) Shields, H. M.; Levine, G. M.; Yezdimir, E. A. (Veterans Admin. Hosp., Philadelphia, PA). *Gastroenterology* 72(5, Part 2): 1130; 1977.

3840 SECRETORY AND CYCLIC AMP (cAMP) RESPONSES TO SHIGELLA ENTEROTOXIN (ST) AND CHOLERA ENTEROTOXIN (CT) [Abstract]. (Eng.) Paulk, H. T.; Cardamone, A. O.; Gotterer, G. S.; Hendrix, T. R. (Johns Hopkins Medical Inst., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1164; 1977.

3841 DISPOSAL OF ACID IN THE PROXIMAL DUODENUM [Abstract]. (Eng.) Sethbhakdi, S.; Roth, J. L. A. (Presbyterian-Univ. Pennsylvania Medical Center, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1129; 1977.

3842 AMMONIA METABOLISM BY ISOLATED PERFUSED ILEUM [Abstract]. (Eng.) Schwarz, K. B.; Karl, I.; Alpers, D. H. (Div. Gastroenterology and Metabolism, Washington Univ., St. Louis, MO). *Gastroenterology* 72(5, Part 2):1128; 1977.

3843 CIRCADIAN RHYTHM ACTIVITY OF SOME DIGESTIVE ENZYMES IN GUINEA PIG SMALL INTESTINE AND PANCREAS. (Cze.) Malis, F.; Lojda, Z.; Fric, P.; Slaby, J. (II. Vedecke oddeleni gastroenterologicke fakulty vseobecneho lekarstvi University Karlovy, 121 11 Prague 2, Karlovo nam. 32, Czechoslovakia). *Cas. Lek. Cesk.* 115(44):1353-1357; 1976.

3844 LIBERATION OF CERTAIN ENZYMES FROM THE INTESTINAL BRUSH BORDER. (Fre.) Eloy, R.; Mirhom, R.; Raul, F.; Vaultier, J. P.; Grenier, J. F. (INSERM U-61, avenue Moliere, F 67200 Strasbourg-Hautepierre, France). *Biol. Gastroenterol. (Paris)* 9:312; 1976.

3845 ENZYMATIC SPECIALIZATIONS OF RAT INTESTINAL EPITHELIAL CELLS DURING POST-NATAL DEVELOPMENT. (Fre.) Raul, F.; Simon, P.; Kedinger, M.; Haffen, K.; Grenier, J. F. (INSERM U-61, avenue Moliere, F 67200 Strasbourg-Hautepierre, France). *Biol. Gastroenterol. (Paris)* 9:318; 1976.

3846 THE EFFECT OF MUSCULAR LOAD ON THE INVERTASE ACTIVITY OF THE SMALL INTESTINE. (Rus.) Kurbanov, Sh. K. (Lab. Digestion Physiology, Inst. Physiology, Uzbek SSR Acad. Sciences, Tashkent, USSR). *Biull. Eksp. Biol. Med.* 82(11):1335-1337; 1976.

3847 MECHANISM OF SUBSTRATE ACTIVATION OF SUCRASE [Abstract]. (Eng.) Ulshen, M. H.; Grand, R. J. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5, Part 2):1143; 1977.

3848 INCORPORATION OF $14^{14}C$-ERUCATE INTO RAT AND HUMAN INTESTINAL MUCOSA. (Fre.) Sueur, R.; Cerf, M.; Di Costanzo, G.; Debray, C. (Service de Gastroenterologie A, Hopital Bichat, 100, boulevard Ney, F 75877 Paris Cedex 18, France). *Biol. Gastroenterol. (Paris)* 9:315-316; 1976.

3849 SOME FEATURES OF THE KINETICS OF ACCUMULATION OF FREE GLUCOSE AND OF GLUCOSE FORMED BY DISACCHARIDE HYDROLYSIS IN ACCUMULATING PREPARATIONS OF RAT SMALL INTESTINAL MUCOSA. (Rus.) Ugolev, A. M.; Nurks, E. E.; Gurman, E. G. (Acad. Medical Sciences USSR, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 231(4):1018-1020; 1976.

3850 THE EFFECT OF CHOLERA TOXIN ON IN VIVO GLYCOPROTEIN SECRETION [Abstract]. (Eng.) Sherr, H.; Broock, R. (Dept. Medicine, Univ. California, San Diego, CA). *Gastroenterology* 75(5, Part 2): 1130; 1977.

3851 ORGANO-TYPICAL CULTURE OF HUMAN INTESTINAL MUCOSA: BIOSYNTHESIS OF GLYCOPROTEINS ASSOCIATED WITH ENZYMATIC ACTIVITIES. (Fre.) Kedinger, M.; Hauri, H. P.; Haffen, K.; Grenier, J. F.; Hadorn, B. (INSERM U-61, avenue Moliere, F 67200 Strasbourg, France). *Biol. Gastroenterol. (Paris)* 9:308-309; 1976.

3852 SURFACE MEMBRANE GLYCOPROTEINS OF CULTURED HUMAN CELLS FROM COLONIC TUMORS AND FETAL INTESTINE [Abstract]. (Eng.) Tsao, D.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1142; 1977.

3853 DIFFERENTIATION OF GLYCOPROTEIN SYNTHESIS IN FETAL RAT COLON [Abstract]. (Eng.) Rampal, P.; LaMont, J. T.; Trier, J. S. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5, Part 2):1115; 1977.

3854 RHYTHMIC FLUCTUATIONS IN SMALL INTESTINAL FUNCTIONS, INSULIN, AND GASTRIN IN ORALLY AND INTRAVENOUSLY FED RATS [Abstract]. (Eng.) Sitrin, H. S.; Stevenson, N. R. (Coll. Medicine and Dentistry New Jersey-Rutgers Medical Sch., Piscataway, NJ 08854). *Gastroenterology* 72(5, Part 2):1133; 1977.

3855 APO(LIPO) PROTEIN A-I PRODUCTION BY RAT SMALL INTESTINE [Abstract]. (Eng.) Schonfeld, G.; Brown, A. R.; Bell, C. E., Jr.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 72(5, Part 2); 1977.

3856 HUMAN INTESTINAL LIPOPROTEINS: APOPROTEIN SYNTHESIS BY DUODENOJEJUNAL MUCOSA [Abstract]. (Eng.) Rachmilewitz, D.; Albers, J. J.; Saunders, D. R. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 72(5, Part 2):1115; 1977.

3857 INTESTINAL CONTRIBUTION TO HYPERLIPOPROTEINEMIA--EFFECT OF SUCROSE FEEDING ON LYMPH LIPOPROTEIN COMPOSITION AND OUTPUT IN THE MESENTERIC LYMPH FISTULA RAT [Abstract]. (Eng.) Kelly, T.; Wu, A. L.; Clark, S. B.; Holt, P. R. (St. Luke's Hosp. Center, New York, NY). *Gastroenterology* 72(5, Part 2):1079; 1977.

3858 ISOLATION OF AN INTESTINAL FACTOR THAT STIMULATES PEPSIN SECRETION. (Fre.) Vagne, M.; Mutt, V.; Perret, G.; Lemaitre, R. (INSERM U-45, Lyon, France). *Biol. Gastroenterol. (Paris)* 9:316-317; 1976.

See also, 3584, 3590, 3591, 3592, 3598, 3599, 3601, 3606, 3622, 3630, 3679, 3688, 3866, 3867, 3868, 3872, 4133.

GENERAL

3859 BALANCE STUDY OF TWENTY TRACE ELEMENTS DURING TOTAL PARENTERAL NUTRITION IN MAN. (Eng.) Jacobson, S.; Wester, P. O. (Dept. Surgery, Huddinge sjukhus, 141 86 Huddinge, Sweden). *Br. J. Nutr.* 37(1):107-206; 1977.

The balances of 20 trace elements (Ag, As, Au, Br, Cd, Co, Cr, Cs, Cu, Fe, Hg, La, Mo, Ru, Sb, Sc, Se, Sm, W, and Zn) were determined in four adult male patients parenterally fed a special diet that included a fat emulsion and an electrolyte solution containing Fe, Zn, Mn, Cu, F, I, Ca, and Mg. The trace elements were analyzed by an ion exchange technique based on neutron activation followed by gamma spectrometry. The amounts of trace elements added corresponded approximately to those analyzed. All other trace elements determined were unintentionally administered in the parenteral supply. Fe, Ag, Co, Cr, Cu, Sb, Sc, and W were retained, and Br, Rb, As, Au, Cd, Cs, Mo, Se, and Zn were lost. However, Zn was retained by one patient with short bowel syndrome. The serum concentration of 13 trace elements decreased during parenteral nutrition, in agreement with the corresponding balance values. FAO/WHO and other recommendations for essential, possibly essential, and unlikely to be essential trace elements for man and animals are reviewed. Admin-

tration of trace elements in long-term total
renteral nutrition is recommended.

360 WHOLE BODY ALBUMIN MASS AND DISTRIBUTION
IN RATS FED ON LOW-PROTEIN DIETS. (Eng.)
ward, W. A.; Sawyer, M. B. (MRC Dunn Nutrition
it, Dunn Nutritional Lab., Univ. Cambridge,
lton Rd., Cambridge, CB4 1XJ, England). *Br. J.
tr.* 37(1):127-134; 1977.

o groups of 5-week-old rats were fed diets
ntaining 210 g (controls) or 31 g protein/kg
d sacrificed over a 3-week period to determine
asma albumin concentration, plasma volume, and
tal vascular and extravascular albumin mass.
asma albumin concentrations were lower in rats
d the low-protein diet (27 g/l versus 33 g/l
controls at 12 days), but plasma volume was
ightly greater (51 versus 46 ml/kg at 12 days).
tal vascular albumin mass was significantly
ss in experimental animals at 8 and 20 days,
t it was significantly lower than initial
lues only at 20 days. Extravascular albumin mass
.6 versus 2.4 g/kg at 20 days) and whole-body
bumin mass (3 versus 3.8 g/kg at 20 days) were
so significantly reduced in the experimental
imals. A significant redistribution of whole-
dy albumin mass was shown by a lower ratio of
e extravascular albumin mass:vascular mass. It
concluded that plasma albumin concentration
es not indicate the real whole-body albumin losses
protein deficiency, because total vascular
bumin mass is maintained somewhat at the expense
extravascular albumin mass.

61 BIOCHEMICAL CHARACTERISTICS OF DIFFERENT
FORMS OF PROTEIN ENERGY MALNUTRITION;
EXPERIMENTAL MODEL USING YOUNG RATS. (Eng.)
ard, C. R. C.; Frangi, S. M.; Wright, P. M.;
Cartney, P. R. (Clinical Nutrition and Metabolism
it, Dept. Human Nutrition, London Sch. Hygiene
d Tropical Medicine, Keppel St., London WC1E 7HT,
gland). *Br. J. Nutr.* 37(1):1-21; 1977.

ur groups of young male rats were fed diets consis-
ng either of high protein (HP) *ad libitum,* low pro-
in (LP) *ad libitum,* HP restricted to the amount
e LP rats consumed, or HP followed by 2 days of
sting. The rats on LP or restricted AP diets
nsumed about 50% as much as the HP-fed rats,
d their body weights were about 35% and 55% of
e HP-fed rats, resp. The LP and restricted
rats had low fasting insulin levels and low
sulin:glucose ratios during glucose tolerance
sts carried out in the fourth week of the diet.
e rats were sacrificed after 4 weeks. LP rats
owed low values for hemoglobin (15% lower than
rats), plasma protein concentration, and hepatic
ucose-6-phosphatase and alanine aminotransferase
tivities, but hepatic aspartate aminotransferase
tivity was slightly increased. Plasma amino acid
ncentrations and ratios showed decreases in
anched chain amino acids, and liver fat content
s increased about 100%. Rats on the restricted
diet showed normal hemoglobin, plasma protein,
and liver fat concentrations and almost normal plasma amino acid levels. Hepatic alanine aminotransferase was increased, but the muscle enzyme was decreased. Rats fasted for 48 hr following an HP diet had high hemoglobin, plasma protein, liver fat content, and hepatic alanine aminotransferase levels and low liver glycogen and plasma alanine levels. The data indicate lowered gluconeogenesis, liver dysfunction, and essential amino acid deprivation in rats on an LP diet, features similar to those seen in kwashiorkor. Rats on a restricted HP diet had symptoms similar to those of nutritional marasmus. The authors compare their results in rats with biochemical changes observed in infant malnutrition.

3862 CAPILLARY REGIONAL BLOOD FLOWS IN DIGESTIVE ORGANS OF THE RAT UNDER URETHANE ANESTHESIA: A STUDY OF ISOPROTERENOL, PROPRANOLOL, AND SECRETIN. (Fre.) Dupont, C.; Jean, E.; Roze, C.; Wepierre, J. (Laboratoire de Pharmacodynamie, U.E.R. Chimie Therapeutique, Centre d'Etudes Pharmaceutiques, F 92290 Chatenay-Malabry, Paris, France). *Biol. Gastroenterol. (Paris)* 9(2):129-138; 1976.

The effects of i.v. infusion of isoproterenol (IS: 0.6-15 µg/kg), with or without concomitant propranolol (PR: 2 mg/kg), and secretin (SE: 0.125-0.5 U/kg) on cardiovascular hemodynamics and capillary regional blood flow in the digestive tract were studied in urethane-anesthetized rats. After IS perfusion, hypotension and tachycardia developed, but only high doses (5 and 15 µg/kg) caused a transient decrease in cardiac output (CO). Blood pressure, pulse rate, and peripheral resistance increased significantly 5 min after IS and then dropped. PR decreased CO and heart rate, but increased peripheral resistance significantly. Pretreatment with PR inhibited the effects of IS on the cardiovascular parameters. IS alone had no effect on blood flow in the salivary glands, rumen, or fundus, but it decreased the flow in the pancreas, small intestine, and liver. When PR was given prior to IS, however, blood flow in the pancreas, stomach, small intestine, and liver was increased. No cardiovascular changes were seen following treatment with SE. This agent only increased pancreatic blood flow significantly at a dose of 0.5 U/kg/min.

3863 INFLUENCE OF SMALL BOWEL MOTILITY ON ITS MICROCIRCULATION. (Fre.) Coulic, V.; Maximenkova, A.; Finikova, L. (Chaire d'Anatomie humaine, Universite de l'Amitie des Peuples P. Lumumba, Moscow, B-302, USSR). *Biol. Gastroenterol. (Paris)* 9:289-294; 1976.

Simultaneous balloonographic investigation of bowel motility and biomicroscopy of the bowel wall in rabbits, guinea pigs, and rats showed evidence of some dependence between microcirculatory processes and intestinal contractile cycles. The correlation may account in part for the pathogenesis of functional modifications seen after neuroreflectory isolation and autotransplantation of the small bowel.

GENERAL

3864 ADRENERGIC MECHANISMS IN THE HEPATIC ARTERIAL CIRCULATION OF BABOONS. (Eng.) Swan, K. G.; Kerr, J. C.; Wright, C. B.; Reynolds, D. G. (Div. General and Vascular Surgery, New Jersey Medical Sch., 100 Bergen St., Newark, NJ 07103). *Surgery* 81(3):326-334; 1977.

Injections of norepinephrine or epinephrine (0.025 μg/kg/min) in anesthetized baboons caused dose-dependent decreases in hepatic arterial blood flow. The responses were attenuated by alpha-adrenergic blockade (AAB) with phenoxybenzamine (1.5 mg/kg), but unchanged by beta-adrenergic blockade (BAB) with propranolol (0.5 mg/kg). Injections of isoproterenol (0.25 μg/kg/min) caused increases in hepatic arterial flow that were reversed to constriction at low doses of the agonist but attenuated at high doses by BAB. The extent of constriction was attenuated by AAB but not potentiated by BAB. Intrahepatic arterial infusions of epinephrine or norepinephrine were not accompanied by autoregulatory escape, and the degree of constriction was attenuated by AAB but not potentiated by BAB. Small increases in hepatic arterial blood flow (Q=70 ml/min) were caused by relatively large intrahepatic arterial infusions of isoproterenol (0.25 μg/kg), which were not potentiated by AAB but were attenuated by BAB. The results suggest a relative decrease in beta receptor activity in the hepatic arterial bed of the baboon relative to regional circulations such as the mesenteric and femoral beds. Beta receptors are relatively resistant to stimulation and blockade.

3865 THE ROLE OF GASTRIC MUCOSAL BLOOD FLOW AND H^+ BACK-DIFFUSION IN THE PATHOGENESIS OF ACUTE GASTRIC EROSIONS. (Eng.) Cheung, L. Y.; Chang, N. (Veterans Admin. Hosp., Salt Lake City, UT 84132). *J. Surg. Res.* 22(4):357-361; 1977.

The relation between ischemia and disruption of the gastric permeability barrier in the pathogenesis of acute gastric erosions was evaluated in 14 dogs. Studies were carried out on the effect of (1) hemorrhagic shock; (2) topical application of *p*-chloromercuribenzene sulfonate (PCMBS); and (3) shock plus PCMBS on total and mucosal blood flow, H^+ back-diffusion, and mucosal injury. The fractional distribution of blood flow through the layers of gastric tissue remained unchanged during control, shock, and reinfusion periods. Exposure of the mucosa to PCMBS resulted in a significant increase in H^+ back-diffusion, which was accompanied by a rise in mucosal blood flow. Hemorrhagic shock alone caused a marked mucosal ischemia without disruption of the permeability barrier. The most severe mucosal injury occurred only under experimental conditions where ischemia and increased H^+ back-diffusion were induced simultaneously. These results suggest that: (1) A cause-effect relationship does not exist between ischemia and barrier disruption in the pathogenesis of acute ulcerations; (2) mucosal blood flow may play an important role in the disposal of H^+ permeating the mucosa; and (3) the ratio of mucosal blood flow to back-diffusion of H^+ may determine the degree of mucosal injury.

3866 THE ROLES OF INTRALUMINAL OXYGEN AND GLUCOSE IN THE PROTECTION OF THE RAT INTESTINAL MUCOSA FROM THE EFFECTS OF ISCHAEMIA. (Eng.) Robinson, J. W. L.; Mirkovitch, V. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne 11, Switzerland). *Biomedicine (Express)* 27(2):60-62; 1977.

The protective actions of oxygen and glucose were evaluated in the ischemic rat intestine, using the change in phenylalanine accumulation *in vitro* to assess the extent of damage. Ileal loops were subjected to 15 min periods of ischemia by clamping both mesenteric and collateral vessels. Ischemia reduced the *in vitro* ability of the intestine to accumulate phenylalanine, from a control value of 0.643 ± 0.0355 to 0.195 ± 0.0259 μmol/100 mg wet weight. If the lumen had been flushed with an oxygenated buffer containing 0.1% glucose, there was complete protection of the mucosa, the phenylalanine uptake being 0.774 ± 0.0410 μmol/100 mg.g. No protection was afforded by a prior rinsing with a buffer saturated with nitrogen and containing no glucose. When glucose was added to the nitrogenated buffer, there was some protection (0.457 ± 0.0688 μmol/100 mg), but the phenylalanine uptake was still significantly lower than that of control loops. In the absence of glucose, the protective influence of the oxygenated buffer was attenuated, the phenylalanine level being 0.494 ± 0.0730 μmol/100 mg. A factorial analysis of variance to test the efficacy of the different agents in protecting against the effects of ischemia revealed that the effects of oxygen and of glucose are perfectly additive, each having a separate protective influence. The independent and additive actions of glucose and oxygen imply that the rat enterocyte is capable of obtaining energy supplies from two metabolic sources and, consequently, that the cellular energy levels have a role in the prevention of anoxic damage.

3867 REVERSAL OF INTESTINAL SEGMENTS FOR TREATMENT OF MALABSORPTION AFTER SMALL BOWEL RESECTION. (Ger.) Kieninger, G. (Chirurgische Universitatsklinik, Calwer Strasse 7, D-7400 Tubingen, W. Germany). *Med. Klin.* 72(13):554-559; 1977.

The effect of reversal of intestinal segments was studied in 50 guinea pigs divided into groups of 14 animals. Three groups had a 90% small bowel resection with either no reversal, primary, or secondary reversal; one unoperated group served as controls. The reversal segments, 5 or 10 cm in length, were inserted in the middle or at the end of the remaining jejunum or ileum. Parameters evaluated included weight, survival time, intestinal transit time, absorption capacity measured by expiration of $^{14}CO_2$, and determination of stool fat. Small intestine segments were also examined macroscopically and histologically. The intestinal transit time of animals with reversal of one or two 5- or 10-cm segments was 5 and 6 times greater than that of animals without reversal. The increased transit time was positively correlated to the postoperative weight gain and survival time; 12/14 animals with reversal with the ileum remnant survived and showed a normal weight development, whereas both groups without reversal died of hunger cachexia within 3 months. A marked weight gain and improvement in general condition were noted in five of six cachexic animals following a secondary reversal. Animals with intestinal segment reversal also showed a significantly higher absorptive capacity, and exhalation of $^{14}CO_2$ approached that of controls. Furthermore, these groups showed 3.1 g% of fat in stool as compared with 7.7 g% in animals without a reversal (2.0 g% in controls). After 1 yr, a significant increase in the length and width of the remaining intestine was also noted in the animals with a reversal, and histology revealed hyper-regeneration of muscle layers and mucosa. The author recommends this surgical procedure for clinical use.

3868 INFLUENCE OF EXPERIMENTAL BYPASS ON CELLULAR KINETICS AND MATURATION OF SMALL INTESTINAL EPITHELIUM IN THE RAT. (Eng.) Rijke, R. P. C.; Plaisier, H. M.; de Ruiter, H.; Galjaard, H. (Dept. Cell Biology and Genetics, Erasmus Univ. Rotterdam, P.O. Box 1738, Rotterdam, Netherlands). *Gastroenterology* 72(5):896-901; 1977.

The effect of experimental bypass on the intestinal epithelium was investigated 2-360 days after creating a Thiry-Vella fistula in male Glaxo Wistar rats. Within 7-14 days, the number of cells per villus column and, to a lesser degree, the number of cells per crypt column decreased (by 80% in the former case), and subsequently these values remained constant up to 1 yr. Radioautography showed no changes in the percentage of labeled cells per crypt column after incorporation of $[^3H]$thymidine. In addition, the relative size of the proliferative cell compartment in the crypt, the number of crypts per unit length of small intestine, and the crypt: villus ratio remained unchanged. Scintillation counting of isolated crypts from the Thiry-Vella fistulas showed that the number of cells per crypt was markedly reduced. Scanning electron microscopy revealed that the three-dimensional size of the villi was also reduced. The activities of nonspecific esterases and neutral α-glucosidase remained unchanged in crypt cells and were above control values in villus cells. The development of these biochemical characteristics of the villus cells seems to be independent of the luminal contents. It is concluded that deprivation of food passage and gastric, pancreatic, and liver secretions from a small intestinal segment causes primarily a reduction in the number of cells per crypt, which leads to a lower cell production; in turn, this is responsible for the reduction of the functional villus cell compartment.

3869 PROTECTIVE EFFECTS OF PASSIVELY TRANSFERRED IMMUNE T- OR B-LYMPHOCYTES IN MICE INFECTED WITH Salmonella typhimurium. (Eng.) Hochadel, J. F.; Keller, K. F. (Sch. Medicine, Univ. Louisville, Louisville, KY 40201). *J. Infect. Dis.* 135(5):813-823; 1977.

The relative contributions of both humoral and cell-mediated immune responses to the protection of mice against lethal infection with *Salmonella typhimurium* were compared by separating the subpopulations of lymphocytes and using these subpopulations to supplement normal animals prior to challenge. Purified populations of bone marrow-derived (B-) lymphocytes and thymus-derived (T-) lymphocytes were obtained from C3D2F1 hybrid mice shown to be immune to *S. typhimurium*. These subpopulations of lymphocytes were injected into normal mice; 4 days later the animals were challenged with a 50 LD$_{50}$ dose of *S. typhimurium*, and viable bacteria in livers, spleens, and blood were counted at various intervals after challenge. On day 8 after challenge, the mice supplemented with B-lymphocytes showed a significant decrease in the number of organisms recovered from all three sites, compared with that seen in recipients of T-lymphocytes and in controls. The mice given B-lymphocytes showed a better survival rate (65%) than mice that received only T-lymphocytes (21%) or T-lymphocyte fractions contaminated 10%-30% with B-lymphocytes (49%). These data indicate that, although the humoral response is not totally protective, it does play an important role in the suppression of the infection during its early stages.

3870 IMMUNOLOGICAL INTERACTIONS BETWEEN Trichinella spiralis AND Trichuris muris IN THE INTESTINE OF THE MOUSE. (Eng.) Bruce, R. G.; Wakelin, D. (Dept. Zoology, Univ. Glasgow, G12 8QQ, Scotland). *Parasitology* 74(2):163-173; 1977.

The immunological interactions between *Trichinella spiralis* and *Trichuris muris* were investigated in the intestine of outbred (CFLP) and inbred (NIH) mice. The inflammatory response, which is thought to be partly responsible for the expulsion of *Trichinella spiralis* from the mid-region of the small intestine, also seemed to be largely responsible for the simultaneous (i.e., early) expulsion of *Trichuris muris* from the cecum and large intestine during concurrent primary infections. The interactive expulsion operated only when the concurrent infections were timed to produce *T. spiralis* expulsion before *T. muris* expulsion would normally occur, and the effect producing early expulsion of *T. muris* persisted for several days after *T. spiralis* had been expelled. Interactive expulsion was depressed during indomethacin (0.1 mg/day, p.o.) treatment and during T-cell depletion, even though in thymectomized mice there was a delayed, partial expulsion of *T. spiralis*. These results indicate that a T-cell mediated inflammatory response was probably the basis of the interaction. When the timing of the infections was altered such that the expulsion of *T. muris* occurred before that of *T. spiralis* there was no reciprocal expulsion of the latter. Mice immunized against one or the other species did not show cross-immunity on heterologous challenge, confirming that the interaction did not involve similar antigens in the two species. The interactive expulsive response is considered to be an example of an indirect cross-immunity.

3871 SMALL INTESTINAL INJURY IN THE GRAFT VERSUS HOST REACTION: AN INNOCENT BYSTANDER PHENOMENON. (Eng.) Elson, C. O.; Reilly, R. W.; Rosenberg, I. H. (Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 72(5):886-889; 1977.

Studies were carried out to determine whether the intestine is injured in the graft-versus-host reaction (GVHR) as an antigenic target of the grafted immunocompetent cells or as an innocent bystander to donor-host lymphoid interaction. Implants of fetal mouse small intestine from either C57BL/6 or (C57BL/6 x DBA/2)F$_1$ (BDF$_1$) hybrid donors were placed under the kidney capsule of adult BDF$_1$ male mice. After 4 weeks, both groups were injected with parental C57BL/6 spleen cells (100 x 10^6 cells, i.v. and 175 x 10^6 cells, i.p.), syngeneic BDF$_1$ spleen cells, or no cells. Two weeks after injection, the mice were killed and the implants were removed. The villus-crypt ratio in the BDF$_1$ implants of mice receiving C57BL/6 cells was 1.32 ± 0.3 compared to 2.51 ± 0.4 in controls receiving either syngeneic BDF$_1$ cells or no cells ($p<0.001$). The villus-crypt ratio in the C57BL/6 implants of mice receiving C57BL/6 cells was 1.79 ± 0.4 compared to 2.48 ± 0.4 in the controls receiving either syngeneic BDF$_1$ cells or no cells ($p<0.001$). Because the latter implant is antigenically identical to the spleen cells eliciting the GVHR, it is concluded that the small bowel is injured in the GVHR as an innocent bystander to cytotoxic donor-host lymphoid interaction.

3872 INTESTINAL LYSOSOMAL ENZYME ACTIVITY IN REGIONAL SIMULATED SHOCK: INFLUENCE OF METHYLPREDNISOLONE AND ALBUMIN. (Eng.) Haglund, U.; Lundholm, K.; Lundgren, O.; Schersten, T. (Surgical-Metabolic Res. Lab., Dept. Surgery II, Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *Circ. Shock* 4:27-34; 1977.

The effects of methylprednisolone (30 mg/kg i.v.) or albumin (intraluminal) on cats subjected to simulated intestinal shock were studied. Methylprednisolone prevented mucosal lesions, cardiovascular deterioration, and release of lysosomal and cytoplasmic enzyme. Albumin deposition prevented lysosomal enzyme release and cardiovascular disturbances, but had only a slight effect on mucosal lesions. The release of intestinal lysosomal enzymes may be important for the development of mucosal lesions and for the production of cardiotoxic material. The effects of methylprednisolone and albumin in preventing damage during shock may be due to the maintenance of microcirculatory integrity.

3873 ANIMAL EXPERIMENTS CONCERNING ESOPHAGOGASTROSTOMY IN ESOPHAGEAL REPLACEMENT OF THE STOMACH. (Ger.) Kunath, U. (Zentrum der Chirurgie der Johann Wolfgang Goethe-Universitat, Theodor-Stern-Kai, D-6000 Frankfurt a. Main, W. Germany). *Langenbecks Arch. Chir.* 343(3):217-227; 1977.

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3882 OXYGEN CONSUMPTION OF THE RAT SMALL INTESTINE DURING INFECTION WITH Nematospiroides dubius. (Eng.) Scofield, A. M. (Unit Applied Zoology, Wye Coll. [Univ. London], Wye, Ashford, Kent, TN25 5AH, England). *Experientia* 33(2):187-188; 1977.

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3897 DUODENOGASTRIC REFLUX OF LYSOLECITHIN IN THE PATHOGENESIS OF EXPERIMENTAL PORCINE STRESS ULCER [Abstract]. (Eng.) Kivilaakso, E.; Ehnholm, C.; Kalima, T.; Lempinen, M. (Univ. Central Hosp., Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Eur. Surg. Res.* 8(Suppl. 2):55-56; 1976.

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3914 COLLOIDAL SOLUTION OF LABELED ^{131}I MICROAGGREGATES OF ALBUMIN IN STUDYING THE RETICULOENDOTHELIAL SYSTEM OF THE LIVER. (Rus.) Gabuniia, R. I.; Ikonnikov, A. I. (Scientific Res. Inst. Medical Radiology, USSR Acad. Medical Sciences, Obninsk, USSR). *Sov. Med.* (12):50-53; 1976.

3915 PHARMACOKINETICS AND PLASMA ALBUMIN BINDING OF IOTROXIC ACID (BILISCOPIN), IODOXIC ACID (ENDOMIRABIL) AND IOGLYCAMINE (BILIGRAM). (Ger.) Taenzer, V.; Speck, U.; Wolf, R. (Stadt. Krankenhaus Moabit, Turmstrasse 21, 1000 Berlin 21, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 126(3):262-267; 1977.

3916 MACROSCOPIC AND MICROMORPHOLOGIC EVALUATION OF VIABILITY IN EXTRACORPOREAL PERFUSED PIG LIVERS. (Ger.) Fischer, M.; Wustrow, T. (Institut fur Experimentelle Chirurgie, Technischen Universitat Munchen, Ismaningerstrasse 22, D-8000 Munchen 80, W. Germany). *Res. Exp. Med.* 169(3):203-212; 1977.

3917 AMINO ACID COMPOSITION OF THE SUBCELLULAR LIVER STRUCTURES IN THE RAT AND THE INFLUENCE OF PROTEIN DEFICIENCY ON IT. (Rus.) Pokrovsky, A. A.; Ekimovsky, A. P.; Somin, V. I.; Tuteliyan, V. A.; Kravchenko, L. V. (Inst. Nutrition, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Pitan.* (5):25-29; 1976.

3918 TRANSJUGULAR PUNCTURE OF THE PORTAL VEIN. PORTOGRAPHY AND SELECTIVE PHLEBOGRAPHY OF ABDOMINAL ORGANS: AN EXPERIMENTAL STUDY IN DOGS. (Ger.) Luska, G.; Kupper, W.; Nonnig, R.; Reznik, G.; Huchzermeyer, H. (Medizinischen Hochschule, Karl-Wiechert-Allee 9, 3000 Hannover 61, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 126(3):213-217; 1977.

3919 ANALYSIS OF THE EFFECTS OF β-ACTING DRUGS UPON HEPATIC CIRCULATION: AN EXPERIMENTAL STUDY [Abstract]. (Eng.) Lenriot, J. P.; Ulrich, B.; Travagli, J. P.; Sandmann, W.; Xhaard, M. (Centres d'Etudes des Techniques Chirurgicales, Paris, France). *Eur. Surg. Res.* 8(Suppl. 2):88-89; 1976.

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3921 BLOOD REDISTRIBUTION IN THE MICROCIRCULATORY SYSTEM OF THE LIVER. (Rus.) Chernukh, A. M.; Kovalenko, N. Ya. (Inst. General Pathology and Pathophysiology, USSR Acad. Medical Sciences, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):74-85; 1976.

3922 HEPATIC MICROCIRCULATION IN EXPERIMENTAL CHOLESTASIS IN RABBITS [Abstract]. (Eng.) Isman, H.; Brizard, M.; Bourgeon, R. (Laboratoire de Chirurgie Experimentale, Chemin de Vallombrose 06034 Nice, France). *Eur. Surg. Res.* 8(Suppl. 1):20-21; 1976.

3923 MICROMORPHOLOGIC OBSERVATIONS OF THE INTRAHEPATIC BLOOD VESSELS IN THE GUINEA PIG. (Ita.) Cecio, A.; Lepore, G.; Vittoria, A.; Mele, A. (Facolta di Medicina Veterinaria dell' Universita di Napoli, Naples, Italy). *Boll. Soc. Ital. Biol. Sper.* 51(13):835-838; 1975.

3924 LIVER CHALONES. (Rus.) Loginov, A. S.; Speransky, M. D.; Aruin, L. I.; Matyushina, E. D.; Magnitsky, G. S. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Biull. Eksp. Biol. Med.* 82(12):1482-1484; 1976.

3925 HISTOCHEMICAL STUDY OF DENERVATED LIVER ENZYMES. (Rus.) Kapinosov, I. K. (Dept. Human Anatomy, Zaporozhe Medical Inst., Zaporozhe, USSR). *Vestn. Khir.* 117(10):30-32; 1976.

3926 ANTITOXIC LIVER FUNCTION IN MECHANICAL JAUNDICE. (Rus.) Magdiev, T. Sh. (Clinical Hosp., Makhachkala, USSR). *Eksp. Khir. Anesteziol.* (6):42-43; 1976.

3927 STUDIES ON THE POSSIBLE PROTECTIVE FUNCTION OF CYSTEINE DURING ACUTE ALCOHOLIC INTOXICATION. (Fre.) Beauge, F.; Clement, M.; Nordmann, R.; Nordmann, J. (Hopital de la Salpetriere, 47, Boulevard de l'Hopital, 75013 Paris, France). *Arch. Int. Physiol. Biochem.* 84(4):843-850; 1976.

3928 EFFECTIVENESS OF SODIUM SELENITE IN EXPERIMENTAL DYSTROPHY OF THE LIVER. (Rus.) Danik, L. M. (Ternopol Medical Inst., Ternopol, USSR). *Farmakol. Toksikol.* 39(2):204-207; 1976.

3929 THE ACTION OF SILYMARIN ON GALACTOSAMINE-INDUCED HEPATITIS IN THE RAT. (Ger.) Barbarino, F.; Suciu, A.; Cotutiu, C.; Ban, A. (Institut fur Offentliches Gesundheitswesen und Medizinische Forschung, str. Iasilor nr. 16, Cluj-Napoca, Rumania). *Wien. Klin. Wochenschr.* 89(3):90-95; 1977.

3930 THE EFFECT OF SYREPAR IN EXPERIMENTAL DYSTROPHY OF THE LIVER IN ALBINO RATS. (Rus.) Skakun, L. N. (Dept. Pharmacology, Ternopol Medical Inst., Ternopol, USSR). *Farmakol. Toksikol.* 39(3):333-335; 1976.

See also, 3590, 3603, 3648, 3659, 3708, 3767, 3845, 3854, 4056, 4233.

DIAGNOSTIC PROCEDURES

3931 ACCIDENTS IN COURSE OF ESOPHAGO-GASTRODUODENAL FIBROSCOPY. NATIONAL ENQUIRY ON 150,000 ESOPHAGO-GASTRODUODENAL FIBROSCOPIES. (Fre.) Hancy, A.; Condat, M.; Cougard, A.; Mathieu, B.; Pin, G.; Granjon, B.; *et al.* (27, bd d'Athenes, 13001 Marseilles, France). *Ann. Gastroenterol. Hepatol. (Paris)* 13(2):101-110; 1977.

According to a national survey in France, 162 accidents (50 fatal) occurred during a total of 150,680 esophago-gastroduodenal endoscopies. Of the 50 deaths, 31 occurred during emergencies for digestive bleedings and 19 during nonemergency procedures. The major types of accidents included 30 pulmonary injuries (18 fatal due to acute bronchopneumopathy by inhalation); 32, digestive hemorrhaging (13 fatal); 31, digestive perforations (9 fatal); and 12 cardiac accidents (9 fatal). One patient died during operation for esophageal cancer while the endoscope was only at the mouth of the esophagus. Two deaths were attributed to premedication; one of the two patients died after developing ventricular fibrillation subsequent to an injection of atropine. The authors call for caution during these procedures.

3932 RADIOLOGICAL DIAGNOSIS OF CROHN'S DISEASE WITH SPECIAL REFERENCE TO INVOLVEMENT OF THE STOMACH (DOUBLE-CONTRAST METHOD). (Ger.) Habermann, M.; Windorfer, K.; Petzel, H. (Roentgendiagnostische Abteilung der Medizinischen Klinik Bad Cannstatt, Priessnitzweg 24, 7000 Stuttgart 50, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6):508-510; 1976.

Double-contrast radiology was used to diagnose Crohn's disease in a 19-yr-old man. Barium sulfates (70 ml) with dimethylpolysiloxane, followed by 300 ml of air, was given by stomach tube. Initially, the patient had gastric pains, anorexia, vomiting, and anemia. Serum iron was low, and the iron absorption test was pathological. Endoscopy revealed gastric stenosis; duodenal gastric reflux was present, and the entire stomach and bulbus showed mucosal changes indicative of small ulcers with edematous swelling. Histological examination of biopsy material from the bulbus, representative of Crohn's disease, revealed some granulomas that were partially comprised of epitheliallike swollen histiocytes, lymphocytes, and plasma cells. No necroses were seen. Double-contrast radiology showed that the antrum was constricted and that it had a rigid appearance. Contrast medium deposits in the form of irregular fine reliefs were seen. The areae gastricae was partially coarse and vague. The changes extended to the duodenal bulbus. Crohn's disease was detected only in the last 15 cm of the terminal ileum. The large intestine also showed typical Crohn's disease changes, especially in the ascending colon. Crohn's disease of the stomach can be demonstrated by double-contrast radiology through recognition of the detailed mucosal changes, together with other typical findings.

3933 GAS IN PORTAL VEIN OF ADULTS WITH NECROTIZING ENTEROPATHY. (Eng.) Naus, P. J.; Kawanishi, H.; Borlaza, G. S. (Veterans Admin. Hosp., Univ. Michigan Medical Sch., Ann Arbor, MI). *Tex. Med.* 73(3):67-73; 1977.

Case studies of two adult men with severe generalized atherosclerotic vascular diseases and bowel necrosis secondary to mesenteric arterial thrombic occlusion were reported. Gas in the portal vein is a frequent phenomenon that usually indicates intestinal necrosis and demands prompt surgical treatment. The gas is carried to the periphery of the liver by the centrifugal flow of portal radicals. It has been postulated that gas-forming bacteria may cause gas in the portal vein, but there are numerous other associated conditions that may be causal. Air in the hepatic portal vein has frequently been associated with other conditions: peroxide anemia, ingestion of corrosive substances, umbilical vein catheterization, a dead fetus, small bowel obstruction, and rectal bleeding in patients with severe underlying atherosclerotic vascular disease. It has also been reported as a benign phenomenon after barium enema in a patient with ulcerative colitis. In adults, air in the portal vein is predominantly associated with ischemic and bowel necrosis. Shock, sepsis, and instrumentation are predisposing factors. Despite increased observance, few adult survivors with gas in the portal vein have been reported. It was emphasized that a roentgenogram of the right quadrant of the abdomen is needed to establish promptly a correct diagnosis. Since gas in the portal vein is most often the result of enteric necrosis, exploratory celiotomy should be considered immediately. Patients affected with gas in the portal vein do not always appear to be acutely and seriously ill.

3934 HISTOLOGICAL PARAMETERS FOR THE DIAGNOSIS OF HIRSCHSPRUNG'S DISEASE BY DOUBLE SUCTION BIOPSIES. (Ger.) Willital, G. H.; Meier, H. (Chirurgischen Univ.-Klinik, 8520 Erlangen, W. Germany). *Z. Kinderchir. Grenzg.* 21(2):154-167; 1977.

The localization, frequency, and distribution of ganglia and ganglion cells were determined by serial sections of the lowest 6-cm rectal segment of a 4-months-old deceased girl. Results of double variance analyses revealed significant differences in the mean distribution of ganglia cells in the anorectum with respect to the mean distance from the anocutaneous line and the localization of the plexus. Ganglia also showed an irregular distribution pattern in the submucous and myenteric plexus. Examination of the superficial submucous plexus showed significant differences in the ganglia cell density in the first cm proximal to the anocutaneous line as compared with proximal contiguous areas. No significant differences were noted between the 2nd- and 6th-cm segments. The irregular distribution pattern in the submucous and myenteric plexus can result in a false negative result in a suction biopsy, since the ganglion-free areas can exceed the size of the suction in normal individuals. Acetylcholinesterase activity in the lamina propria of the mucosa is more accurately diagnostic of an innervation defect of the intestine as seen in aganglionosis.

3935 RADIOIMMUNOASSAYS OF CEA AND ALPHA-1-ACID GLYCOPROTEIN IN GASTRIC JUICE. APPLICABILITY TO THE DETECTION OF GASTRIC CANCER. (Fre.) Barbotte, P. J.; Bali, J. P.; Remy-Heintz, N.; Balmes, J. L. (Clinique des Maladies de l'Appareil digestif, C.H.R. Saint-Eloi, F 34000 Montpellier, France). *Biol. Gastroenterol. (Paris)* 9(3):233-241; 1976.

Carcinoembryonic antigen (CEA) and alpha-1-acid glycoprotein (AGP) were determined by radioimmunoassays in the gastric juice of patients with gastric cancer (GCa, 28 patients), noncancerous digestive diseases (DD, 30 patients), and 28 controls. GCa was confirmed histologically in 24 patients; 2 had glandular epitheliomas, and 2 had mixed metatypical epitheliomas. Of the 30 DD patients, 15 had benign gastric ulcers (1 with intestinal metaplasia), 9 had a bulbous ulcer, and 6 had hypersecretory or atrophic gastritis. All 58 patients had a significantly elevated AGP level (mean 7,717 and 1,058 μg/ml) compared with the CEA level (mean 2,920 and 668 μg/ml). However, controls had a mean CEA level of 685 μg/ml and a mean AGP level of 276 μg/ml. The total protein level (Lowry method) was slightly raised in the GCa patients. The correlation of AGP and CEA and total proteins was statistically significant. Of the 28 GCa patients, 23 had a positive AGP test, but only 9 had a positive CEA test. Nine of the 30 DD patients also had a positive AGP test, but only 1 showed a positive CEA test. One control subject each had a positive CEA and AGP test. The results suggest that AGP and CEA may be induced by similar mechanisms.

3936 MEASUREMENT OF GASTRIC EMPTYING OF SOLID FOOD. A COMPARISON OF TWO PHASES BY DOUBLE ISOTOPE TECHNIQUE. (Ger.) Guller, R.; Nemec, H. W.; Kyle, L.; Fridrich, R. (Medizinische Universitats-Poliklinik, Hebelstrasse 1, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107 (13):442-446; 1977.

A method of measuring the rate of gastric emptying of solids using ^{99m}Tc-marked filter paper pieces and ^{198}Au-tagged liver was evaluated in five healthy volunteers. Paper pieces were soaked in ^{99m}Tc sulfur colloid, bathed in 5% plexiglas in chloroform (Perspex), dried, and treated with Perspex again. The liver was obtained from rabbits given ^{198}Au i.v. and killed 0.5 hr later. The rabbit liver was excised and then minced and mixed in equal parts with calf liver. Each subject received about 30 filter paper pieces with an activity of 80 μCi ^{99m}Tc mixed with 200 g potato puree, 70 g of liver with an activity of 50 μCi ^{198}Au, and 200 ml water. In all five subjects, the pieces of filter paper were emptied from the stomach at a significantly faster rate ($p<0.05$) than from the liver; a linear emptying pattern was demonstrated in each instance. The difference in the rate of emptying of both solid phases differed in each subject. The results indicate that both solids and liquids and different types of solids are emptied from the stomach at different rates. The use of ^{99m}Tc-labeled filter paper is a justified and practical method for measuring gastric emptying of solid food.

3937 INFLUENCE OF AMYLASE ASSAY TECHNIQUE ON RENAL CLEARANCE OF AMYLASE-CREATININE RATIO. (Eng.) Levitt, M. D.; Johnson, S. G.; Ellis, C. J.; Engel, R. R. (Box 346, Dept. Medicine, Univ. Minnesota, Minneapolis, MN 55455). *Gastroenterology* 72(6):1260-1263; 1977.

The influence of amylase assay technique on the renal amylase/creatinine clearance (Cam/Ccr) measurement was determined by analyzing serum and urine specimens obtained from 10 normal subjects. Cam/Ccr averaged 2.19 ± 0.18% with a saccharogenic technique, 1.52 ± 0.2% with an iodometric technique, and 0.80 ± 0.08% with a chromogenic technique. Each of these values differed significantly ($p<0.05$) from the other two. Recovery studies were carried out by adding partially purified human salivary or pancreatic amylase to human newborn serum or urine (which contain minimal endogenous amylase). Equal amylase activity was recovered from serum and urine by the saccharogenic technique, whereas recovery from urine was less than 50% of that from serum using the iodometric and chromogenic techniques. The accuracy of the chromogenic technique was markedly improved by the addition of albumin to the urine assay system. Although it appears that only the saccharogenic method provides an accurate estimate of Cam/Ccr, each assay technique distinguished the elevated Cam/Ccr of patients with pancreatitis from the normal range established for that technique. Accurate clinical interpretation of Cam/Ccr measurement requires knowledge of the amylase assay technique used.

3938 PANCREATIC FUNCTIONAL EXPLORATION BY DUODENAL TUBAGE AFTER CERULEIN AND SECRETIN STIMULATION. (Fre.) Gislon, J.; Lefevre, R.; Fiesse-Vandale, P. Y.; Bonfils, S. (Service de Gastro-Enterologie B, Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 65(6):463-472; 1976.

The effect of a single injection of cerulein (30 ng/kg) on amylase, lipase, and bicarbonate secretion during secretin perfusion (2 Boots U/kg/hr) was studied in 68 subjects: 25 patients with chronic pancreatic disease, 23 with various digestive diseases, and 20 normal controls. Patients with chronic pancreatic disease had much lower bicarbonate and amylase concentrations. Patients with various digestive disorders showed random fluctuation in these parameters. The authors suggest that the method may be useful for detecting pancreatic deficiencies in early stages.

3939 POSSIBILITIES AND LIMITATIONS OF ANGIOGRAPHY FOR CHRONIC PANCREATITIS. (Fre.) Magotteaux, P.; Delvigne, J. (Hopital de Baviere, Boulevard de la Constitution 66, B-4000 Liege, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):490-501; 1976.

The advantages and disadvantages of angiography (AR) in the diagnosis of chronic pancreatitis is reviewed. Selective catheterization, according to the method of Seldinger, allows visualization of arteries, capillaries, parenchyma, and veins. Superselective catheterization yields an image of the lesion itself. If this fails, vasoconstrictors (adrenalin and nonadrenalin derivatives) or vasodilators are injected. AR allows a direct view of pancreatic structures so that small lesions, and the nature of the lesions, may be elucidated. It also yields precise information on neighboring organs (liver, spleen, and vesiculae), giving a complete evaluation of possible lesions of the upper abdomen. However, AR has certain disadvantages. It is sometimes difficult to establish a differential diagnosis between malignant tumor of the pancreas and chronic pancreatitis, when the tumor is relatively small. A 2% complication rate was noted in 2,000 abdominal examinations by AR, which included thrombosis (3) of the femoral artery at the site of puncture. Acute and irreversible mesenteric ischemia developed after catheterization of the superior mesenteric artery in an elderly patient with severe arteritis. Through its direct approach, arteriography enables the detection of very small pancreatic lesions; however, its use should be limited as it is an aggressive technique, which requires specialized tools.

3940 ABDOMINAL TOMOMETRY. APPLICATION TO STUDY OF THE LIVER. EXPERIMENTAL STUDY, INITIAL CLINICAL RESULTS AND PERSPECTIVES IN THE EXPLORATION OF TUMOR PATHOLOGY.

(Fre.) Lamarque, J. L.; Bruel, J. M.; Dondelinger, R.; Senac, J. P.; Rabischong, P.; Bonnel, F.; *et al.* (Hopital Saint-Eloi, F 34000 Montpellier, France). *J. Radiol. Electrol. Med. Nucl.* 58(4):253-260; 1977.

An Acta-Scanner tomometer was used to study various hepatic disorders in 120 patients, and comparative tomometric and pathological studies were carried out on cadavers and isolated livers. Serial axial transverse sections allowed for the reconstruction of the actual volume of liver. Densitometry led to a quantified diagnosis of certain diffuse hepatic diseases and a histological approach to tumor lesions. Fifty-six patients had livers with normal morphology and 64 presented with pathologic livers. Twenty tumor lesions observed included benign hydatid cysts, hamartomas, calcified hemangiomas, malignant hepatomas, and hepatic metastases. The nontumorous lesions included dilatations of the intrahepatic biliary tract, hepatic trauma, and amebic abscess. Histological examination showed that, in the majority of the cases, the tumor lesions absorbed less iodized opacifier than healthy parenchyma; the morphological picture was that of an intrahepatic defect. Cysts and the abscess appeared as homogeneous hypodense zones. Nontumor lesions appeared as rounded or elongated defects. Of the 20 cases described, only 3 false negatives occurred. Clinically, after i.a. or i.v. injection of liposoluble agents, lesions >1 cm in diameter could be easily recognized or localized. Hepatography with low doses of liposoluble agents (0.04 ml/kg) in pigs showed that the 2-6 mm defects induced with a probe became clearly visible regardless of the hepatic topography. The Acta-Scanner tomometer for various hepatic disorders made possible the recognition of normal structures and the identification of certain hepatic images that may be potential sources of error. This method allows hepatosplenic tumors <1 cm in diameter to de diagnosed.

3941 NEW THERAPEUTIC POSSIBILITIES IN THE DIAGNOSIS OF CONGENITAL CYSTIC BILE DUCT DILATATIONS.

(Ger.) Faust, H.; Gyr, K. (Institut fur Medizinische Radiologie, Universitat Basel, CH-4004 Basel, Switzerland). *Fortschr. Roentgenstr.* 126(3):209-212; 1977.

A 30-yr-old woman, suspected of having recurrent pancreatitis and sclerosis of Vater's papilla, was examined by cholecystography and i.v. cholangiocystography. No pathology was found; however, retrograde cholangiocystography revealed enlarged bile and hepatic ducts, with multiple polygonal, prepapillary, pinhead-sized concretions of contrast medium and enlarged bile ducts with multiple cystic sacs in the liver. The cystic duct and the gallbladder showed no abnormalities. These findings are characteristic of congenital bile duct dilatation described by Caroli. Following intraoperative cholangioscopy, choledochotomy was performed with bile duct revision, transduodenal papillotomy, cholecystectomy, and T-drainage. Irrigation with chenodeoxycholic acid with prophylactic antibiotics was carried out and the intrahepatic concretions were diminished. The value and risks of prophylactic p.o. therapy with chenodeoxycholic acid after removal of T-drain have not been determined.

3942 DOUBLE-STRANDED DNA-BINDING CAPACITY OF SERUM IN ACUTE AND CHRONIC LIVER DISEASE.

(Eng.) Jain, S.; Markham, R.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Clin. Exp. Immunol.* 26(1):35-41; 1976.

Serum antibodies to double-stranded native DNA were measured in patients with acute and chronic liver diseases using the Farr technique. Elevated DNA binding levels were found in all groups of patients when compared with the mean value of 25 ± 3.1% for 27 healthy subjects. The mean DNA binding levels for 27 patients with systemic lupus erythematosis, 59 patients with hepatitis B surface antigen (HBsAg)-negative chronic active hepatitis (CAH), 15 patients with HBsAg-positive CAH, 38 patients with primary biliary cirrhosis, 16 patients with alcoholic cirrhosis, 15 patients with acute type A hepatitis, and 12 patients with acute type B hepatitis were 51 ± 15.0, 41.1 ± 16.0, 41.9 ± 5.8, 28.8 ± 8.5, 37.6 ± 8.7, 50.7 ± 9.6, and 46.8 ± 6.9%, resp. Within each diagnostic group, the correlation between DNA binding and serum aspartate transaminase (AsT) levels was highly variable, suggesting that elevated DNA binding is not a simple reflection of hepatocellular damage. The AsT level, which was initially 368.5 ± 361.1 IU/l for acute type A viral hepatitis and 588.3 ± 283.3 IU/l for acute type B, fell toward normal faster than did DNA binding as these patients recovered, with the recovering AsT levels being 38.3

± 52.6 and 34.6 ± 36.2 IU/1 for types A and B hepatitis, resp., and the recovering DNA binding levels being 40.3 ± 8.6 and 35.0 ± 9.0% for types A and B hepatitis, resp. In all of these patients, the outcome was clinical and biochemical recovery, and those who were HBsAg-positive eventually became negative. However, all of the patients with HBsAg-positive CAH had elevated DNA binding, suggesting that continued elevation might be an unfavorable prognostic marker in acute type B hepatitis. DNA antibody levels will not offer diagnostic help in chronic liver diseases, and because DNA binding was elevated in HBsAg-negative CAH patients who were either biochemically controlled or uncontrolled by corticosteroid therapy, it will not help in assessing which of these patients responds favorably to steroid treatment.

3943 EVALUATION OF BILIARY TRACT DISEASE BY ULTRASONIC B-MODE SCANNING. (Eng.) Addison, N. V.; Follows, O. J.; Weedon, M. R. (Royal Infirmary, Bradford, England). *Br. J. Surg.* 63(10): 784-787; 1976.

The place of the sonar scan in the diagnosis of biliary tract disease was evaluated, and the information obtained by this method was compared with information obtained from plain films, contrast radiography, and laparotomy. One hundred and forty patients with symptoms of biliary colic, acute and chronic cholecystitis, acute pancreatitis, and jaundice were scanned and also had a plain film of the biliary tract; 105 also had p.o. cholecystography or i.v. cholangiography, and 123 underwent laparotomy. Among the 133 patients who had not undergone a previous cholecystectomy, ultrasonic B-mode scanning visualized the gallbladder in 119. The scan indicated the presence of gallstones in 55 cases; 47 were confirmed at laparotomy, and 8 were false positives. There were 25 false negative cases. Among these 25, stones had been diagnosed by p.o. radiography in 10 cases and by i.v. radiography in 2 others. The common bile duct was not visualized by the scan in 13 cases. The gallbladder was visualized by the sonar scan in 19 of 24 patients with transient jaundice. The scan detected stones in 11 of 17 patients with stones detected at laparotomy, whereas stones were seen with contrast radiography in 12 cases (70%). The results suggest that, in the absence of jaundice, sonar compares well with p.o. cholecystography in demonstrating the gallbladder, but is not as useful as i.v. cholangiography in demonstrating the duct system. In the presence of jaundice, sonar is the imaging examination of choice.

3944 CLINICAL EVALUATION OF ^{99m}Tc-PYRIDOXYLIDENEGLUTAMATE FOR HEPATOBILIARY SCANNING. (Eng.) Matolo, N. M.; Stadalnik, R. C.; Wolfman, E. F., Jr. (Univ. California Sch. Medicine, Davis, CA 95616). *Am. J. Surg.* 132(6):716-719; 1976.

The use of technetium 99m-pyridoxylideneglutamate (^{99m}Tc-PG) in hepatobiliary scanning was evaluated clinically in 20 normal volunteers and 83 patients with hepatobiliary tract disease. Sequential images were obtained at 5, 10, 20, 30, and 60 min after the i.v. injection of ^{99m}Tc-PG (2-3 mCi or, in jaundiced patients, 4-5 mCi). These concentrations allowed satisfactory imaging of the biliary ductal system and the gallbladder. In normal subjects, the agent reached the liver in 5 min, and the common bile duct, gallbladder, and duodenum in 10-20 min. In the seven patients with partial common bile duct obstruction, a distended duct was visualized, and there was a delay in transit of radioactivity into the duodenum. The gallbladder was not visualized when the cystic duct was obstructed in patients with acute and chronic cholecystitis. In the 13 patients with complete common bile duct obstruction, no radioactivity was seen in the biliary or gastrointestinal tracts up to 24 hr after injection. In all 22 patients with hepatocellular disease, delayed liver clearance and delayed visualization of the biliary and gastrointestinal tracts were observed. No toxic or other untoward effects were noted in any patient. ^{99m}Tc-PG cholescintigraphy is a simple and safe diagnostic modality for the initial evaluation of patients with acute cholecystitis or jaundice.

3945 HEPATOBILIARY SCANNING USING ^{99m}Tc-PYRIDOXYLIDENEGLUTAMATE. (Eng.) Matolo, N. M.; Stadalnik, R. C.; Wolfman, E. F., Jr. (Univ. California Sch. Medicine, Davis, CA 95616). *Am. J. Surg.* 133(1):116-120; 1977.

Clinical experience is reported with technetium 99m-pyridoxylideneglutamate (^{99m}Tc-PG) cholescintigraphy in 27 normal volunteers, 84 patients with right upper quadrant pain, and 55 patients with jaundice. Patients without jaundice received 2-3 mCi of ^{99m}Tc-PG i.v., and jaundiced patients received 4-5 mCi. ^{99m}Tc-PG was not associated with any toxic or other untoward effects, and satisfactory images of the biliary tract were obtained with the doses used. Radioactivity in the normal volunteers appeared in the common bile duct, gallbladder, and duodenum within 15 min. The gallbladder was not visualized when the cystic duct was occluded. Among the 84 patients with pain, 46 had acute or chronic cholecystitis. These patients all had nonvisualization of the gallbladder, but the hepatic duct, common bile duct, and duodenum were visualized in all cases. Each was proved operatively and histologically to have acute and/or chronic cholecystitis with cystic duct obstruction. Of the 55 jaundiced patients, 8 had partial common bile duct obstruction, and all had prompt visualization of the biliary tract with a distended common bile duct but delayed ^{99m}Tc-PG secretion into the duodenum. In 16 patients with complete extrahepatic biliary obstruction, no concentration of the agent was seen in the biliary and gastrointestinal tracts up to 24 hr after injection. Delayed visualization of the biliary and gastrointestinal tracts was seen in the 31 jaundiced patients with hepatocellular disease. ^{99m}Tc-PG cholescintigraphy is valuable in the initial evaluation of patients with acute cholecystitis or jaundice. Other advantages include safety, simplicity, and availability.

3946 SPLENIC ^{198}Au UPTAKE DURING SCINTIGRAPHY FOR HEPATOMA. (Ita.) Roncaia, R.; Piaggi, V. (Istituto di Clinica Medica, Universita di

Modena, Modena, Italy). *Prog. Med. (Roma)* 31(6): 268-273; 1975.

The diagnostic value of ^{198}Au splenic uptake in the detection of primary hepatoma was studied retrospectively in 849 case histories of patients with liver cirrhosis (808), primary hepatoma without cirrhosis (14), and cancer-induced cirrhosis (27). All patients were subjected to routine hepatic scintiscanning with ^{198}Au. ^{198}Au splenic uptake was found in all 41 cirrhotic patients (other results not reported); uptake was associated with medullary fixation of the isotope in 8 of these patients, and was interpreted as a definite absence of hepatoma. Among the patients with cancer-induced cirrhosis confirmed by positive biopsies and the presence of fetoprotein, 25 showed splenic uptake, which was associated with medullary fixation in 10. No splenic uptake was seen in the patients with confirmed primary hepatoma. The absence of splenic ^{198}Au uptake after hepatic scintiscanning appears to be a valid test for the detection of primary hepatoma. ^{198}Au splenic uptake found in rare cases of apparently primary hepatoma may be due to portal hypertension, modifications of the hepatosplenic flow, and reticuloendothelial activation leading to a cirrhogenous process. The correct diagnosis in such cases should be that of cancer-induced cirrhosis.

3947 SERUM LIPASE ACTIVITY AND EVOCATION TESTS AFTER ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY.

(Ger.) Kratochvil, P.; Brandstatter, G.; Wiedner, F.; Justich, E.; Petek, W. (Landeskrankenhaus Graz, Auenbruggerplatz 1, A-8020 Graz, Austria). *Wien. Klin. Wochenschr.* 89(7):227-231; 1977.

Serum lipase activity (SLA) was determined in 51 patients before, immediately after, and 24 hr after endoscopic retrograde cholangiopancreatography (ERCP). A lipase evocation test was performed in 10 of the patients with elevated SLA 2-10 days after ERCP to determine the extent of tissue damage. An increase in SLA without clinical signs of acute pancreatitis was noted immediately after the procedure in 20/51 patients; 24 hr later SLA was still high in 3 of these patients, rising in 2, normal in 11, and diminished in 4 patients. The behavior of SLA in patients with pathological duct changes did not differ from patients with a normal pancreatogram. The extent of a rise in SLA after ERCP is not dependent upon pathological duct changes but upon the extent of retrograde duct filling. The lipase evocation test performed 10 days after ERCP showed negative results in patients with increased SLA and parenchymography. However, positive pathological results were noted 2 days after ERCP in four patients. Injection of contrast medium into the pancreatic duct may cause a reversible damage of the pancreas by increasing membrane permeability of the acinous cells. A series of 150 tests showed that the addition of gentamycin (40 mg to 20 ml 60% urografin) to the contrast medium may prevent the development of acute pancreatitis: three cases of pancreatitis developed in a series of 200 tests in which gentamycin was not injected with urografin.

3948 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY IN THE DIAGNOSIS OF BILIARY TRACT CARCINOMA: A STUDY OF 23 CASES.

(Fre.) Bitoun, A.; Bognel, J. C.; Bernier, J. J. (Clinique Gastro-Enterologique, Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Arch. Fr. Mal. App. Dig.* 65(5):361-367; 1976.

Biliary tract carcinoma was diagnosed in 23/276 patients with cholestatic jaundice by endoscopic retrograde cholangiography (ERC). Patients were medicated with droperidol and phenoperidine. The contrast agent methylglycamide was mixed with gentamycin and injected into the biliary tract. The tumor was localized in the porta hepatica (PH) in nine patients, common bile duct (CBD) in eight, and gallbladder (GB) in six patients. Laparoscopy of 9/23 patients revealed an enlarged cholestatic liver in all 9. The GB was normal or flat in five of these patients, and one appeared to bear a neoplasm. The nine tumors localized in the PH appeared irregular and stenotic, with infiltrations to the GB. All patients had their tumor excised. Of the eight patients with CBD tumors, four had cancer of the intrapancreatic bile duct with stenosis, and the other four had cancer of the hepatic bile duct. Of the six patients with suspected GB tumors, one had lithiasis of the CBD. Upon surgery, retropancreatic ganglionic metastases were found in 1/23 patients. Following ERC, cholangitis with septicemia developed in one patient with GB cancer. She was cured after a surgical shunt procedure was performed 48 hr after catheterization.

3949 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH THE "SKINNY" NEEDLE: A RAPID, SIMPLE AND ACCURATE METHOD IN THE DIAGNOSIS OF CHOLESTASIS.

(Eng.) Pereiras, R.; Chiprut, R. O.; Greenwald, R. A.; Schiff, E. R. (Veterans Admin. Hosp., 1201 N.W. 16th St., Miami, FL 33125). *Ann. Intern. Med.* 86: 562-568; 1977.

Radiographic findings with "skinny" needle cholangiography in 129/131 patients with cholestasis were confirmed in subsequent surgery or autopsy. Biliary trees were successfully visualized in all 86 patients with dilated biliary ducts, and this method was useful in diagnosing various disorders: (1) bifurcation tumors and high biliary tract disease; (2) common duct stones; (3) pancreatic disease, especially in the presence of active inflammatory process; and (4) when previous surgery had altered gastrointestinal tract so that retrograde visualization was not possible. The "skinny" needle technique successfully visualized the biliary tree in 43/45 patients with nondilated ducts and varied pathology: (1) cirrhosis, with or without extrahepatic obstruction; (2) benign postoperative cholestasis; and (3) sclerosing cholangitis. Six cases are presented in detail, and technical recommendations on the procedure are given.

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(Cze.) Fric, P.; Horacek, F.; Kotrlik, J.; Ronsky, R.; Vondrackova, M.; Pitha, F.

(II. vedecke gastroenterologicke oddeleni fakulty vseobecneho lekarstvi University Karlovy, 121 11 Prague 2, Karlovo nam. 32, Czechoslovakia). *Cas. Lek. Cesk.* 115(37):1135-1141; 1976.

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3953 INJECTION CHOLECYSTOGRAPHY--INFLUENCE OF RADIOPAQUE SUBSTANCE INJECTION TIME ON THE EXCRETION OF CONTRAST MEDIA AND INCIDENCE OF SIDE EFFECTS. (Ger.) Schmerwitz, W. (Burgerhospital, Tunzhoferstr. 14-16, D-7000 Stuttgart 1, W. Germany). *Roentgenblaetter* 30(2):64-70; 1977.

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3956 QUANTITATIVE SERUM IMMUNOGLOBULIN DETERMINATION: DIFFERENTIAL DIAGNOSTIC SIGNIFICANCE FOR LIVER DISEASE. (Ger.) Kleinschmidt, J.; Schlicht, I. (Klinikum Steglitz, Hindenburgdamm 30, D-1000 Berlin 45, Germany). *Med. Klin.* 72(12): 505-512; 1977.

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4013 MEASUREMENT OF BILIARY TRACT SIZE AND DRAINAGE TIME: COMPARISON OF ENDOSCOPIC AND INTRAVENOUS CHOLANGIOGRAPHY. (Eng.) Belsito, A. A.; Marta, J. B.; Cramer, G. G.; Dickinson, P. B. (St. Paul Gastroenterology Ltd., Suite 420, 280 N. Smith Ave., St. Paul, MN 55102). *Radiology* 122(1):65-69; 1977.

4014 A CLINICAL AND RADIOLOGICAL TRIAL OF MEGLUMINE IOGLYCAMATE, A NEW INTRAVENOUS CHOLANGIOGRAPHIC CONTRAST MEDIUM. (Eng.) Lake, W. T.; Engelbrecht, H. E. (Dept. Radiology, Univ. Natal, Durban, South Africa). *S. Afr. Med. J.* 50(50):2007-2011; 1976.

4015 ORAL-CHOLANGIOGRAPHY WITH IOSUMETIC ACID. (Fre.) Novak, M. D. (Hopital Universitaire Eppendorf, Hamburg, W. Germany). *Bordeaux Med.* 9(16):1265-1269; 1976.

4016 TECHNIQUE OF ENDOSCOPIC CHOLANGIOWIRSUNGOGRAPHY. (Fre.) Cremer, M.; Hermanus, A.; Deltenre, M.; de Toeuf, J.; Toussaint, J. (No affiliation given). *Bordeaux Med.* 9(16):1312-1316; 1976.

4017 THE DIAGNOSTIC SIGNIFICANCE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN SO-CALLED POSTCHOLECYSTECTOMY SYNDROME. (Ger.) Brandstatter, G.; Kratochvil, P.; Wiedner, F. (Landeskrankenhaus Graz, Auenbruggerplatz 9, A-8020 Graz, Austria). *Wien. Klin. Wochenschr.* 88(24):806-810; 1976.

4018 ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATICOGRAPHY (ERCP). (Nor.) Osnes, M.; Myren, J.; Wolland, T. (Ulleval sykehus, Gastroenterologisk laboratorium, Denmark). *Tidsskr. Nor. Laegeforen.* 95(5):289-292; 1975.

See also, 3592, 3598, 3753, 4019, 4024, 4027, 4030, 4034, 4041, 4042, 4043, 4051, 4052, 4054, 4060, 4065, 4077, 4096, 4118, 4145, 4149, 4151, 4158, 4159, 4167, 4169, 4173, 4175, 4194, 4195, 4203, 4212, 4220, 4224, 4226, 4234, 4245, 4252, 4282, 4327, 4353, 4354, 4358, 4359, 4367, 4375, 4379, 4383, 4384, 4387, 4388, 4391, 4395, 4435, 4437, 4453, 4456, 4463, 4468, 4470, 4472.

GASTROINTESTINAL DISEASES

ESOPHAGUS

4019 ENDOSCOPIC AND HISTOLOGICAL CHANGES AT THE Z-LINE. (Ger.) Clemencon, G.; Gloor, F. (Kantonsspital Olten, Frohheinweg 12, CH-4600 Olten, Switzerland). *Dtsch. Med. Wochenschr.* 102(16): 609-612; 1977.

Endoscopic and histological changes of the Z-line were studied in 79 patients (23 women and 56 men, mean age of 47.5 yr) with reflux esophagitis. Selective forceps biopsies were obtained from the Z-line, from the cardia directly beneath it and from the esophagus 1-3 cm above. Of the 79 patients, endoscopy was normal in 47, and 30 showed grade I changes (lymphocytes, plasma cells in superficial mucosal layers); 2 patients presented with grade II changes (superficial gastritis). Histological examination of 72 patients showed that 24 had no inflammatory changes of the Z-line, whereas 31 had grade II and 17 had grade III changes. Of 70 patients evaluated for changes of cardiac mucosa, 47 showed no inflammation, while 16 had grade II and 7 had grade III inflammatory changes. Esophageal mucosa was not changed in 58 patients, whereas marked inflammatory cell infiltration was seen in 13 patients. A comparison of endoscopy and histology findings showed that when grade III changes are taken into consideration, only 6/43 patients with normal endoscopy presented inflammation in comparison with the inflammation observed in 11/28 with pathological endoscopic findings. Thus, endoscopy with histological examination can reveal reflux esophagitis in the early stages, but the differentiation from normal remains difficult.

4020 ACHALASIA OF THE ESOPHAGUS: CORRELATION OF CLINICAL, RADIOLOGICAL, AND MANOMETRIC FINDINGS. (Fre.) Couturier, D.; Roze, C.; Rosemond, A.; Guindo, A.; Lequerler, Y.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877, Paris Cedex 18, France). *Gastroenterol. Clin. Biol.* 1: 151-157; 1977.

Achalasia of the esophagus was diagnosed by clinical, radiological, and manometric findings in 43 patients (13-82 yr of age). Of the 43 patients, 34 were treated by pneumatic dilations. Manometry showed that basal pressures in the lower sphincter, the esophagus, and the upper sphincter were significantly stronger in 43 patients with achalasia as compared to 10 healthy controls. On the average, 4.6 yr elapsed from the onset of the first symptoms to time of diagnosis; 12/43 patients presented with esophageal pain. Radiology revealed definite distension of the esophagus: a median value of 4.1 cm for the entire group as compared with normal dimension of no more than 3 cm. Regurgitation was present in 24 of the patients before (16) or after (8) meals; late regurgitation was present in most of the patients with large extension of the esophagus. Notches at the edges of the esophagus suggesting tertiary contractions were observed in 30% of the cases. The diagnosis of achalasia of the esophagus was made by manometry in 18% of the patients who did not have distension of the esophagus. A very satisfactory improvement in symptoms occurred in 56% of the patients following pneumatic dilations.

4021 RADIOTHERAPY OF ESOPHAGEAL CANCER. A REVIEW OF 136 CASES TREATED AT THE BORDET INSTITUTE. (Fre.) Van Houtte, P. (Institut Jules Bordet, Rue Heger-Bordet 1, B-1000 Brussels, Belgium). *Acta Gastroenterol. Belg.* 40(3/4):121-128; 1977.

The results of treatment of 136 patients with esophageal cancer by high-energy radiotherapy (5,000-8,000 rads in 6 weeks), alone (120 patients), or in addition to surgery (16) are presented. The ages of the patients ranged from 34 to 94 yr; 75% were older than 60 yr, and the ratio of men to women was 5 to 1. A histological diagnosis was obtained by esophagoscopy in 103 cases: malpighian carcinomas (97), adenocarcinomas (5), and leiomyosarcoma (1); no histological data were available in 33 cases, all of whom eventually died of their neoplasia. Of the 120 patients given only radiotherapy, 26 survived 1 yr; 7, 2 yr; 2, 3 yr; 1 patient died after 7 yr; and 1 was still alive at 4 yr. Overall, two-thirds of the patients had transient radiological or clinical evidence of improvement. The dose of radiation did not affect the treatment results. Of the 16 patients given combination therapy, only 1 patient survived 5 yr, whereas the others died within a year of tumor evaluation. Complications of radiation treatment included perforations (13), partial myelitis (1), and death due to bronchopneumonia from regurgitation subsequent to esophageal stenosis without signs of local recurrence or generalization. Twenty-six histological controls obtained by esophagoscopy after radiotherapy demonstrated local sterilization of tumor.

4022 THE ASSESSMENT OF OPERABILITY OF ESOPHAGEAL CARCINOMA. (Eng.) Murray, G. F.; Wilcox, B. R.; Starek, P. J. K. (Univ. North Carolina Sch. Medicine, Clinical Sciences Building 229H, Chapel Hill, NC 27514). *Ann. Thorac. Surg.* 23(5):393-399; 1977.

The effectiveness of combined mediastinoscopy and celiotomy for assessing the operability of esophageal epidermoid cancer was evaluated in 30 patients (23 men, 7 women) with esophageal carcinoma. Mediastinoscopy revealed cancer in only 5/18 patients with upper thoracic and midthoracic esophageal carcinoma and in 0/12 patients with lower thoracic esophageal carcinoma. Survival in the five patients with positive mediastinoscopy was brief. Exploratory laparotomy of celiac lymph nodes revealed celiac metastasis in 16/26 patients. All of these 16 patients survived <1 yr, due to extension of cancer outside of the esophagus. Curative resection was possible on 7/10 patients with negative mediastinoscopy and negative celiotomy. Of these seven patients, four survived 14-30 months or more following resection.

Prognosis is very poor for patients with positive mediastinoscopy or celiotomy, and surgical resection did not prolong their survival.

4023 ESOPHAGEAL TUBERCULOSIS PRESENTING AS MASSIVE HEMORRHAGE.

(Fre.) Roche, J. Y.; Desfemmes, F.; Coffin, J. C.; Callard, P.; Patel, J. C. (No affiliation given). *Chirurgie* 103(3):177-182; 1977.

A fatal case of persistent hemorrhaging esophageal tuberculosis complicated by an esophageal ulcer is reported in a 20-yr-old man. Initially, the patient presented with bleeding and endoscopy revealed gastritis that was attributed to recently ingested aspirin. Repeated hemorrhaging required emergency laparotomy and a Blakemore tube was inserted to stop the bleeding. Esophagoscopy showed nonbleeding esophageal ulcers but signs of massive bleeding were seen in the throat. The closing of the esophagotomy was very difficult; hemostasis was obtained by insertion of a Blakemore tube followed by blood infusion, antituberculostatics, and corticoid therapy. Analysis of a tissue sample confirmed tuberculosis. The patient became apyretic in 3 days and stopped bleeding. However, septicemia, collapse, and minor hemorrhaging (hematocrit 28%) occurred on the 6th, 9th, and 11th postoperative day, and the patient died of a massive irreversible hemorrhage on the 15th day. Numerous caseo-follicular tuberculous ganglions were found at the superior posterior surface of the thoracic esophagus and there were three lesions of the esophageal mucosa; two of the lesions were diverticula opposite tuberculous ganglions and the third was a tuberculous ulceration that had destroyed the musculature and eroded an artery. The patient had chronic hepatitis and tiny periportal caseo-follicular lesions. No tuberculous foci of the pulmonary parenchyma were seen.

4024 DETECTION AND GRADING OF OESOPHAGEAL VARICES BY FIBRE-OPTIC ENDOSCOPY AND BARIUM SWALLOW WITH AND WITHOUT BUSCOPAN.

(Eng.) Waldram, R.; Nunnerley, H.; Davis, M.; Laws, J. W.; Williams, R. (King's Coll. Hosp., London SE5, England). *Clin. Radiol.* 28(2):137-141; 1977.

The results of fiberoptic endoscopy in the detection and grading of esophageal varices were compared with those of barium swallow (with and without hyoscine *N*-butyl bromide) in 56 patients with chronic liver disease. Esophageal varices were graded as small, moderate, or gross by independent observers for each technique. In 12 patients, varices were not detected by either method, and in 6 cases, varices were detected by endoscopy when the barium swallow was negative. In 15 of the remaining 38 patients, varices were found to be one grade larger at endoscopy than on barium swallow. Because of the possibility that varices appear larger at endoscopy due to the hyoscine *N*-butyl bromide used as a relaxant, barium examinations were carried out after the administration of the drug (20 mg, i.v.) in 23 patients. In eight cases, varices were one grade larger after the administration of the relaxant than on the standard barium swallow, and in two were only detected after it had been given. Eight cases negative after hyoscine *N*-butyl bromide were also negative at endoscopy. Although emergency endoscopy has particular value in locating the site of bleeding in patients with portal hypertension and acute gastrointestinal hemorrhage, the results suggest that a barium meal with hyoscine *N*-butyl bromide is as accurate as endoscopy in the detection of esophageal varices.

4025 SCLEROSING THERAPY OF ESOPHAGEAL VARICOSIS.

(Ger.) Denck, H.; Sponer, D. (I. Chirurgische Abteilung des Krankenhauses der Stadt Wien-Lainz, Wolkersbergenstrasse 1, A-1130, Vienna, Austria). *Langenbecks Arch. Chir.* 342:173-179; 1976.

The results of sclerosing therapy with Dondren of esophageal varicosis in 422 patients are presented. The agent is composed of granugenol (0.2 g), benzyl alcohol (0.006 g), terpentine oil (0.004 g), diacetylaminoazotoluene (0.02 mg), and liquid paraffin. Between 4 and 20 ml were used at each sitting. The submucosa became sclerotic after the formation of inflammatory edema, from which fibrous scar tissue develops. Of the 422 patients, 51 died of recurrence of bleeding after 0-17 yr. Mortality after sclerosing therapy (12%) was lower than that after emergency shunt operations (29%). Esophagoscopy of 1,280 patients at one clinic revealed that most cases of bleeding were caused by esophageal varicosis (527), duodenal ulcer (271), and peptic ulcer (207).

4026 MATURATION OF THE LOWER ESOPHAGUS.

(Eng.) Boix-Ochoa, J.; Canals, J. (Clinica Infantil Seguridad Social, Po Valle Hebron, s/n, Barcelona, Spain). *J. Pediatr. Surg.* 11(5):749-756; 1976.

4027 THE THERAPEUTIC APPLICATIONS OF ESOPHAGEAL, GASTRIC, AND DUODENAL ENDOSCOPY.

(Fre.) Capron, J. P.; Dupas, J. L. (Clinique Medicale A, Centre Hospitalier Universitaire, 1, place Victor-Pauchet, F 80030 Amiens Cedex, France). *Arch. Fr. Mal. App. Dig.* 65(4):325-332; 1976.

4028 FUNCTIONAL EVALUATION OF COLON TRANSPLANTS USED IN ESOPHAGEAL RECONSTRUCTION.

(Eng.) Corazziari, E.; Mineo, T. C.; Anzini, F.; Torsoli, A.; Ricci, C. (Gastroenterology Unit, II Medical Clinic, Univ. Rome, Rome, Italy). *Am. J. Dig. Dis.* 22(1):7-12; 1977.

4029 MOTOR DISORDERS OF THE ESOPHAGUS.

(Eng.) Pope, C. E., II. (Veterans Admin. Hosp., 4435 Beacon Ave. S., Seattle, WA 98108). *Postgrad. Med.* 61(2):118-125; 1977.

4030 LOWER OESOPHAGEAL SPHINCTER RESTING PRESSURES IN ACHALASIA AND THE RESPONSE OF THE SPHINCTER TO SWALLOWING AND DRUGS. (Eng.) Nielsen, I. J.; Bremner, C. G. (Dept. Surgery, Univ. Witwatersrand, Johannesburg, South Africa). *S. Afr. Med. J.* 50(45):1822-1825; 1976.

4031 THE EFFECT OF GASTRIN HEPTADECAPEPTIDE (G17) ON ESOPHAGEAL CONTRACTIONS IN PATIENTS WITH DIFFUSE ESOPHAGEAL SPASM (DES) [Abstract]. (Eng.) Lane, W.; McCallum R.; Ippoliti, A. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Clin. Res.* 25(2):111A; 1977.

4032 DYSPHAGIA AND ESOPHAGEAL DIVERTICULA. (Eng.) Jordan, P. H., Jr. (1200 Moursund Ave., Houston, TX 77030). *Postgrad. Med.* 61(2): 155-161; 1977.

4033 PALLIATION OF MALIGNANT ESOPHAGO-RESPIRATORY FISTULAE BY PERMANENT INDWELLING PROSTHETIC TUBE. (Eng.) Hegarty, M. M.; Angorn, I. B.; Bryer, J. V.; Henderson, B. J.; Le Roux, B. T.; Logan, A. (Dept. Surgery, Univ. Natal, PO Box 17039, Congella 4013, South Africa). *Ann. Surg.* 185(1):88-91; 1977.

4034 GASTRO-OESOPHAGEAL REFLUX, HIATUS HERNIA AND THE RADIOLOGIST, WITH SPECIAL REFERENCE TO CHILDREN. (Eng.) Steiner, G. M. (British Inst. Radiology, 32 Welbeck St., London W1M 7PG, England). *Br. J. Radiol.* 50(591):164-174; 1977.

4035 ESOPHAGEAL REFLUX: DIAGNOSIS AND THERAPY. (Eng.) Hutcheon, D. F.; Hendrix, T. R. (Johns Hopkins Univ. Sch. Medicine, 725 Wolfe St., Baltimore, MD 21205). *Postgrad. Med.* 61(2):131-137; 1977.

4036 EFFECTS OF POSTURE ON GASTRO-OESOPHAGEAL REFLUX. (Eng.) Stanciu, C.; Bennett, J. R. (St. Spiridon Hosp., Jassy, Rumania). *Digestion* 15(2):104-109; 1977.

4037 SCLEROSING THERAPY FOR BLEEDING OESOPHAGEAL VARICES [Abstract]. (Eng.) Bailey, R. J.; Williams, K.; Bomford, A.; Dawson, J.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Digestion* 14(5/6):497; 1976.

See also, 3874, 3931, 3989, 4061, 4122, 4352, 4390, 4449, 4470, 4471.

STOMACH

4038 CURRENT ANGIOGRAPHIC APPROACH TO DIAGNOSIS AND THERAPY OF ACUTE GASTROINTESTINAL BLEEDING. (Eng.) Rosch, J.; Antonovic, R.; Dotter, C. T. (Univ. Oregon Health Sciences Center, Sch. Medicine, Portland, OR 97201). *Fortschr. Geb. Roengenstr. Nuklearmed.* 125(4):301-310; 1976.

An angiographic approach to the diagnosis and therapy of acute gastrointestinal bleeding is discussed. More than 300 acute gastrointestinal bleeders were studied, and angiotherapeutic techniques were used on 138 of them. A moderately aggressive angiographic approach is advocated for diagnostic purposes, because angiography could give nonproductive results and endanger patients. Emergency endoscopy is suggested as the first procedure of choice, because it indicates the site of and directly exposes the lesion. Medical therapy or surgery is suggested next, depending on the patient's condition. Vasoconstrictive angiotherapy with selective intra-arterial use of vasopressin is reported to be partially replaced by low dose, i.v. infusion of vasopressin (0.2-0.3 U/min). Acute variceal bleeding was stopped in 22 of 28 patients by this technique. Direct vascular occlusion of the bleeding artery is reported to be a useful therapeutic method in managing gastrointestinal bleeding, particularly where vasoconstriction has failed. Selective transcatheterembolic occlusion of bleeding vessels with medical gelatin is suggested for controlling arterial bleeding. A selective variceal occlusion might provide promising means for management of bleeding from gastroesophageal varices. It is possible that combination of this method with transcatheter intrahepatic portosystemic shunting might provide nonsurgical relief of portal hypertension.

4039 EARLY GASTRIC CARCINOMA. 20 CASES. RADIO-CLINICAL, ENDOSCOPIC AND HISTOPATHOLOGICAL STUDY. (Fre.) Negrin-Fragoas, M.; Taieb, A. (17, rue du repos, 75020 Paris, France). *J. Radiol. Electrol. Med. Nucl.* 58(4):269-278; 1977.

Early gastric carcinoma (GC) was studied in 20 patients (11 men, 9 women; age 45-74 yr, median age, 58 yr) by radiology, endoscopy, or histopathology. Symptoms of early GC included typical ulcer syndrome (10 times), atypical epigastric pain or dyspepsia (4), corticoid therapy-induced epigastralgia (1), and digestive hemorrhaging (7). Of the 20 patients, 17 had stage I and II and 3 had stage III carcinomas. Endoscopy revealed projecting, ulcerated, or flat lesions. The former type presented as a filling defect or appeared as large-based polyps, whereas the ulcerated type appeared either as isolated or deep, regressive ulcerations. The flat forms caused an abnormal, smooth, or rounded mucous zone. Anatomically, these lesions were polymorphic and varied widely. Radiologically, the projecting lesions did not suggest cancer, and only histology was able to confirm malignancy. The other forms appeared as superficial or benign ulcers with nodular or widespread folds. Overall, endoscopic results were evaluated as characteristic (3 times), doubtful (6), and benign (2). The differential diagnosis of early GC is difficult because the clinical signs are not alarming, and radiological images are difficult to interpret.

4040 TRANSPYLORIC PROLAPSE OF POLYPOID GASTRIC CARCINOMA. (Eng.) Joffe, N.; Goldman, H.; Antonioli, D. A. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Gastroenterology* 76(2):1326-1330; 1977.

Four patients with discrete intraluminal filling defects in the duodenal bulb secondary to transpyloric prolapse of polypoid gastric carcinoma are discussed. The patients ranged in age from 59 to 79 yr. In two patients, there were no specific abdominal complaints; in both, discovery of the lesion resulted from a work-up for hypochromic anemia and guaiac-positive stools. In one patient, malignancy was suspected because of epigastric pain, anorexia, weakness, and weight loss. In the remaining patient, recurrent episodes of epigastric pain and vomiting raised the possibility of gastric outlet obstruction. Apart from guaiac-positive stools and anemia, which were present in three patients, the clinical examination and laboratory data were normal. An upper gastrointestinal series revealed the intraluminal filling defect in the duodenal bulb in all patients and a similar but smaller defect in the prepyloric region of the antrum in one patient. The malignant nature of the lesions was established preoperatively by endoscopy and biopsy in two patients and at operation in the other two. Two tumors were pedunculated and two were sessile. The lesions were composed entirely of carcinoma in three cases and, in one, carcinoma appeared to arise in a preexisting adenoma. The carcinoma was limited to the mucosa in all patients, and there was no evidence of metastasis. Prolapsed gastric carcinoma should be included in the differential diagnosis of localized intraluminal filling defects in the duodenal bulb.

4041 ENDOSCOPIC STUDY OF GASTRIC LYMPHOMAS. (Fre.) Gruselle, P.; Mainguet, P.; Haot, J.; Willock, R.; Dive, Ch. (Service de Gastroenterologie, Cliniques Universitaires Saint-Pierre, Louvain, Belgium). *Acta. Gastroenterol. Belg.* 39(9/10): 358-365; 1976.

Ten patients with gastric lymphomas were studied by fibergastroscopy and multiple systematic biopsies (128 total). All patients had multiple lesions with one or several giant ulcerations. The lesions were mostly found in the small vertical curvature and antrum and subcardially. The giant ulcerations in 8/10 patients were associated with submucosal, multiple, ulcerated, and nonulcerated nodules. Large permanent folds, small ulcerated tumors, and erosions were seen in five patients. Eight of the 10 patients were suspected of having lymphoma according to endoscopic images and gastric biopsies. Final histological diagnosis revealed mixed or lymphocytic lymphoma in eight patients, histiocytic lymphoma in one, and Hodgkin's disease in one.

4042 DIAGNOSIS OF MULTIPLE GASTRIC CARCINOID TUMORS IN GASTRIC POLYPOSIS. (Ger.) Langhans, P.; Clemens, M.; Schonleben, K.; Heger, R. A.; Schlake, W. (Chirurgische Klinik und Poliklinik der Univ. Allgemeinchirurgie, 4400 Munster/Westfalen, W. Germany). *Roentgenblaetter* 30(3):133-138; 1977.

The problems in the diagnosis and treatment of multiple gastric carcinoid tumors in a patient are presented. X-ray examination revealed multiple filling defects as seen in polyposis ventriculi, a diagnosis also arrived at after endoscopy. Numerous determinations of urinary 5-hydroxyindole acetic acid were normal as were liver function tests. A liver-spleen scintigram showed no indication of metastases. The diagnosis of multiple gastric carcinoid tumors was made on the basis of gastroscopy and histology. Macroscopic examination of the surgical specimen obtained at gastrectomy revealed 31 polyps of the gastric mucosa with diameters of 0.4-2 cm, all of which were histologically carcinoid tumors. The tumor cells were cubic and polygonal with round to oval, eccentrically situated cell nuclei. All carcinoid tumors showed infiltrating growth, and small tumor complexes were detected in the lymphatic spaces. The authors recommend a gastrectomy for multiple gastric carcinoid tumors.

4043 DIVERTICULA OF THE STOMACH--DIAGNOSIS OF THEIR IMPORTANCE. (Ger.) Clemens, M.; Langhans, P.; Heger, R. A.; Safrany, L. (Univ. Allgemeinchirurgie, 4400 Munster/Westf., W. Germany). *Roentgenblaetter* 30(3):126-132; 1977.

The etiology, clinical symptoms, diagnosis, complications, and treatment of diverticula (DV) of the stomach are reviewed. Etiologically they are classified as congenital or true, acquired true, and false DV. The first includes all layers of the gastric wall and are almost always located in the juxtacardiac region. The acquired DV may be separated into those caused by increased intragastric pressure and those caused by traction, especially after inflammatory disease of the pancreas. About 75% of DV are found in the fundus, 15% in the prepyloric antrum, and 10% elsewhere. A 37% coincidence of stomach DV with DV of other sites has been reported, and 80% of stomach DV occur after the age of 40 yr. The clinical symptoms are uncharacteristic; frequent complaints are postprandial epigastric pressure, nausea, vomiting, and heartburn. In most instances, DV are discovered by x-ray examination. Characteristically, there is a smooth outpouching of the wall with an even, often rounded, contour and a narrowed neck. DV retain contrast media, and they may vary in size from a bean to a fist. Diagnosis can be complicated by gastric obstruction of food, mucosa or blood, and in the fundus, pseudodiverticula, hiatal hernias, or gallbladder perforations can lead to a false diagnosis. Treatment is conservative and consists of a bland diet and antacids. Surgery is indicated in large stomach DV and resection if malignancy is present.

4044 NONINVASIVE VASCULAR ASSESSMENT OF DUMPING SYNDROME: USEFULNESS IN THERAPEUTIC DECISIONS.

(Eng.) Creaghe, S. B.; Saik, R. P.; Pearl, J.; Peskin, G. W. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *J. Surg. Res.* 22(4):328-332; 1977.

The vascular effects of vasoactive substances that play a role in postgastrectomy dumping syndrome were measured in eight patients. The presence of true dumping syndrome (versus postvagotomy diarrhea) was established by measuring venous occlusion plethysmography (VOP) volume changes and mercury strain gauge (MSG) finger-tip volume changes. All patients had disabling symptoms of intractable diarrhea, weight loss, vomiting, and/or lightheadedness following ulcer surgery. Their ages ranged from 29 to 60 yr. Each patient underwent a provocation test with the ingestion of 100 g of glucose with the simultaneous measurement of blood pressure, pulse rate, MSG, and finger VOP continuously for 90 min. MSG measurements following glucose challenge demonstrated elevations of 300-1,900% of the control values in five patients; the remaining three patients had peak elevations of only 100-220%. Two of the latter patients and four of the patients with high peak MSG values also underwent simultaneous VOP. The two patients with low MSG volume changes also had low VOP increases (243 and 267%), while the other four patients had increases of 750-2,500% of control. In eight controls who had not undergone gastric surgery, the MSG peaks varied between 171 and 314%, and VOP ranged between 104 and 350%. The three patients with normal MSG and VOP or normal MSG alone all proved to have postvagotomy diarrhea and responded to appropriate treatment. One of the five patients that were diagnosed as having the true dumping syndrome on the basis of these studies benefitted from an interposition procedure; postoperatively, his MSG dropped from 933 to 164% and VOP from 827 to 162%. The measurement of VOP and MSG represents a noninvasive, simple means of assessing the degree of vasodilatation that is presumably secondary to the release of kinin.

4045 DYNAMICS OF ATROPHIC GASTRITIS IN MALE AND FEMALE SUBJECTS AFTER PARTIAL GASTRIC RESECTION--AN EVALUATION BY STOCHASTIC ANALYSIS.

(Eng.) Kekki, M.; Hakkiluoto, A.; Siurala, M. (Pension Insurance Company Ilmarinen, Eerikinkatu 41, 00180 Helsinki 18, Finland). *Scand. J. Gastroenterol.* 11(6):597-601; 1976.

Forty-two subjects were examined for chronic gastritis 17-18 yr following partial gastrectomy for gastric or duodenal ulcer. There were 33 men and 9 women, ranging in age from 44-74 yr (average 60.6 yr) for the men and 57-71 (average 65.4 yr) for the women. Gastroscopic biopsies were obtained, and the state of the mucosa was graded by the following scoring system: 0, normal; 1, superficial gastritis; 2, slight atrophic gastritis; 3, moderate atrophic gastritis; and 4, severe atrophic gastritis (complete or almost complete loss of normal body glands). This score was adjusted for age (age adjusted score, AAS), and the resulting figure represented the degree of progression of chronic gastritis with reference to a random population, independent of the subject's age. The AAS of the 33 male subjects averaged 0.90, which was significantly different in comparison with an average score of -0.17 in male controls ($p<0.001$); the AAS in female subjects and controls did not differ significantly (-0.28 versus 0.01 in controls). The atrophic changes in postgastrectomy patients was not dependent on age. This fact suggests a direct causal relationship between the surgical procedure and gastritis.

4046 PATHOLOGY, CLINICAL APPEARANCE AND THERAPY OF MENETRIER'S DISEASE.

(Ger.) Lenner, V.; Stahlschmidt, M.; Wagner, R.; Neher, M. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Med. Klin.* 72(8):319-325; 1977.

The clinical pathology and therapy of Menetrier's disease in three men are presented. One man presented with hematemesis, epigastric pressure, and a total protein level of 6.6 g%. Gastroscopy revealed giant formations with mucosal hemorrhage layers, especially in the corpus ventriculi. Several biopsies yielded a histological diagnosis of undifferentiated stomach cancer. However, stomach resection showed hyperplastic mucosa in the elongated, cystic gastric foveoli. The gland was atrophic, and the tunica propria showed dense, lymphoplasmic cellular infiltrates and some granulocytes. The second man, who had had a duodenal ulcer, presented with weight loss and epigastric pressure. A histological diagnosis of polypous hyperplasia of the corpus mucosa was made. Surgery disclosed hypertrophic folds and, in places, polypous mucosa in the corpus fundus region in addition to gastric ulcer. A year later, the patient was found to have marked superficial gastritis with foveolar hyperplasia. The third patient had the same histological findings upon biopsy as the second patient, but laparotomy showed no pathological processes on the outside of the stomach. He had a three-fourths gastric resection. Stomach specimens revealed an irregular, built-up mucosa with cystic extension in some places.

The tunica propria was infiltrated with lymphoplasma cells. Although all three patients had Menetrier's disease, each presented with different symptoms. Roentgenologic and endoscopic appearance may contribute to the diagnosis of Menetrier's disease, but only histologic examination is decisive.

4047 GASTRIC SECRETORY FUNCTION IN PATIENTS WITH CHRONIC RENAL FAILURE UNDERGOING MAINTENANCE HEMODIALYSIS. (Eng.) Reisman, T. N.; Perez, G. O.; Rogers, A. I. (Univ. Miami Sch. Medicine, Miami, FL 33125). *Am. J. Dig. Dis.* 21(12):1044-1048; 1976.

Gastric secretion was evaluated in nine male patients with chronic renal failure undergoing maintenance hemodialysis for 15 hr/week. Two patients had low or absent acid output in the basal state, and three of nine patients exhibited hypersecretion (greater than 40 mEq/hr) in response to pentagastrin stimulation (6 µg/kg, i.m.). There were four basal hypersecretors (greater than 5.0 mEq/hr), two of whom had associated peptic ulcer disease. Serum gastrin responses of these patients to a 60-g protein meal were comparable to those of control subjects. Calcium infusion (12 mg/kg calcium gluconate, i.v.) in two nonulcer basal hypersecretors depressed basal acid secretion from 10.9 mEq/hr to an average of 8.9 mEq/hr in one case and from 21.6 mEq/hr to an average of 8 mEq/hr in the other case. A high degree of positive correlation ($p<0.02$) existed between serum parathormone levels and basal acid output. An almost significant positive correlation ($r=0.6559$, $p<0.1$) was observed between fasting serum gastrin levels and basal acid output, suggesting a possible role of gastrin as a stimulant to acid secretion. The results suggest that, while acid secretory abnormalities vary in patients with chronic renal failure on hemodialysis, there is no apparent sensitivity of the gastrin-secreting cells to protein or to calcium ion that might account for acid hypersecretion. Secondary hyperparathyroidism may influence the occurrence of acid secretory abnormalities.

4048 DISMANTLING OF THE ANASTOMOSIS FOR PROBLEMS CONSEQUENT UPON TRUNCAL VAGOTOMY AND GASTROENTEROSTOMY [Abstract]. (Eng.) McMahon, M. J.; Johnston, D.; Goligher, J. C. (General Infirmary, Leeds, England). *Gut* 18(5):A413; 1977.

4049 PYLORUS-PRESERVING PROCEDURE IN PARTIAL AND TOTAL GASTRECTOMY. (Eng.) Maki, T.; Sato, T.; Shiratori, T. (Tohoku Rosai Hosp., Dainohara, Sendai 980, Japan). *Langenbecks Arch. Chir.* 343(3):183-193; 1977.

4050 A NEW METHOD OF GASTRIC REPLACEMENT FOLLOWING TOTAL GASTRECTOMY [Abstract]. (Eng.) Kieninger, G.; Geisse, H.; Durst, J.; Wolf, K. J. (Chirurgische Universitatsklinik, 7400 Tubingen, W. Germany). *Eur. Surg. Res.* 9(Suppl. 1):155; 1977.

4051 CYTOLOGICAL AND HISTOLOGICAL STUDIES IN COMPLEX DIAGNOSIS OF ORGANIC DISEASES OF THE STOMACH. (Rus.) Vorontsov, I. I.; Inshakov, L. N.; Aitkazin, A.; Strelnikova, A. I.; Shatalova, A. S. (Railroad Hosp. No. 4 of Kazakh Railroads, Alma-Ata, USSR). *Klin. Med. (Mosk.)* 54(10):50-54; 1976.

4052 GASTRIC ANGIOENDOTHELIOMA: A CYTOLOGIC EVALUATION. (Eng.) De Gaetani, C. F.; Trentini, G. P. (Inst. Morbid Anatomy, Univ. Modena, via Berengario 4, 41100 Modena, Italy). *Acta Cytol.* 21(2):306-309; 1977.

4053 SO-CALLED EARLY GASTRIC CARCINOMA AND ITS HISTOLOGICAL DELIMITATION. (Ger.) Kuhne-Heid, R.; Bosseckert, H. (Pathologisches Institut, Friedrich-Schiller-Universitat, 69 Jena, Bachstrasse, E. Germany). *Z. Gesamte Inn. Med.* 31(21):885-888; 1976.

4054 POSSIBILITY OF ENDOSCOPIC DIAGNOSIS OF SUPERFICIAL GASTRIC CANCER. (Rus.) Poddubnyi, B. K.; Mikhailov, E. A.; Rottenberg, V. I.; Chistiakova, O. V. (Oncological Scientific Center, Acad. Medical Sciences of USSR, Moscow, USSR). *Klin. Med. (Mosk.)* 54(6):50-55; 1976.

4055 ENZYME SPECTRUM OF THE BLOOD IN CANCER AND PRECANCEROUS CHANGES OF THE STOMACH. (Rus.) Shukurian, S. G.; Khachatrian, A. G. (Armenian Inst. Roentgenology and Oncology, USSR). *Zh. Eksp. Klin. Med.* 16(4):71-77; 1976.

4056 QUANTITATIVE DETERMINATION OF SOME SERUM PROTEINS BY RADIAL IMMUNODIFFUSION IN DUMPING SYNDROME BEFORE AND AFTER RECONSTRUCTION OF THE DUODENUM. (Rus.) Chemodurov, N. T.; Kuriukhin, I. F. (Dept. Surgery, Crimean Medical Inst., USSR). *Klin. Khir.* (11):66-69; 1976.

4057 SECRETIN TREATMENT OF PATIENTS WITH POSTOPERATIVE DUMPING SYNDROME (DYSHORMONAL DIGESTIVE ASTHENIA). (Rus.) Rafes, Iu. I.; Kornilova, S. N. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Klin. Khir.* (11):69-71; 1976.

4058 EFFECT OF MORSHIN MINERAL WATERS ON THE HYDROLYSIS OF LACTOSE IN PATIENTS WITH POSTRESECTION DUMPING SYNDROME. (Rus.) Tumak, M. S. (Dept. Therapy, Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (12):60-63; 1976.

4059 ROENTGENOLOGICAL STUDY IN THE DIAGNOSIS OF DUMPING SYNDROME. (Rus.) Filshtinsky, A. Ya. (Dept. Roentgenology, Donetsk Medical Inst., Donetsk, USSR). *Vestn. Rentgenol. Radiol.* (6):46-51; 1976.

4060 DIAGNOSTIC IMPORTANCE OF MULTIPLE GASTROSCOPIC BIOPSY IN CHRONIC GASTRITIS. (Rus.) Gvantseladze, V. I. (Tbilisi State Medical Inst., Tbilisi, USSR). *Bull. Acad. Sci. Georgian SSR* 84(2):477-480; 1976.

4061 THE ASSOCIATION OF HEARTBURN WITH GASTRITIS. (Eng.) Volpicelli, N. A.; Yardley, J. H.; Hendrix, T. R. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Am. J. Dig. Dis.* 22(4):333-339; 1977.

4062 GASTROPLASTY IN THE TREATMENT OF OBESITY. (Fre.) Leger, L.; Caquet, R.; Janneau, D. (Service de Chirurgie, Hopital Cochin, 27, rue du Fg Saint Jacques, F 75674, Paris Cedex 14, France). *Nouv. Presse Med.* 5(30):1906-1907; 1976.

4063 X-RAY DIAGNOSIS OF PEPTIC ULCER OF THE SMALL INTESTINAL INSERTION. (Rus.) Khodzhimetov, A. K.; Maksumov, D. N. (Dept. Roentgenology, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, USSR Ministry Public Health, USSR). *Vestn. Rentgenol. Radiol.* (6):41-46; 1976.

4064 DIFFICULTIES AND ERRORS IN THE TREATMENT OF PATIENTS WITH RECURRENT AND MULTIPLE PERFORATIONS OF GASTRODUODENAL ULCER. (Rus.) Bashkov, Iu. A. (Dept. Surgery, Izhevsk Medical Inst., Izhevsk, USSR). *Klin. Med. (Mosk.)* 54(7):68-71; 1976.

4065 GASTRIC BRUSHING CYTOLOGY: AN ANALYSIS OF CELLS FROM BENIGN AND MALIGNANT ULCERS. (Eng.) Dziura, B. R.; Otis, R.; Hukill, P.; Goldblatt, P.; Damjanov, I. (Univ. Connecticut Sch. Medicine, Farmington, CT). *Acta Cytol.* 21(2):187-190; 1977.

4066 STRESS ULCER: A CONTINUING DILEMMA. (Eng.) Ritchie, W. P., Jr. (Univ. Virginia Sch. Medicine, Charlottesville, VA). *Compr. Ther.* 2(1):53-61; 1976.

See also, 3655, 3715, 3716, 3721, 3865, 3896, 3898, 3931, 3932, 3935, 3985, 3990, 3992, 3993, 3994, 3995, 3997, 4000, 4019, 4027, 4034, 4036, 4067, 4071, 4074, 4075, 4077, 4078, 4079, 4082, 4083, 4088, 4096, 4109, 4171, 4380, 4396, 4414, 4415, 4443, 4449, 4452, 4453, 4472, 4473.

STOMACH

Peptic Ulcers

4067 CONCENTRATIONS OF PROSTAGLANDIN A-, E- AND F-LIKE SUBSTANCES IN GASTRIC MUCOSA OF NORMAL SUBJECTS AND OF PATIENTS WITH VARIOUS GASTRIC DISEASES. (Eng.) Schlegel, W.; Wenk, K.; Dollinger, H. C.; Raptis, S. (Universitat Ulm, Steinhovelstrasse 9, 7900 Ulm, W. Germany). *Clin. Sci. Mol. Med.* 52(3):255-258; 1977.

Prostaglandin E-, A-, and F-like compounds were measured in antral biopsy material obtained at endoscopy from 8 normal subjects, 10 patients with gastritis, 10 with chronic atrophic gastritis, 13 with acute gastric ulcer, and 16 with duodenal ulcer. In the normal subjects, the amounts of prostaglandin E- plus A-like material varied from 21 to 83 ng/mg protein, and the amount of prostaglandin F-like material varied from 2 to 17 ng/mg. In patients with gastritis, the concentrations of prostaglandin (E+A)-like substances were 6 times higher, and of prostaglandin F-like substances, 2 times higher than in normal subjects. In chronic atrophic gastritis, the concentration of prostaglandin (E+A)-like substances was 4 times as high as in normal subjects, whereas prostaglandin F-like material remained unchanged. The prostaglandin (E+A)-like material reached concentrations 4 times higher than in normal subjects in acute gastric ulcer, accompanied by a fivefold increase in prostaglandin F-like substances. After healing of the gastric ulcers, the levels of prostaglandin-like substances returned to normal. Gastric mucosal damage may stimulate increased prostaglandin formation in the area of the destroyed tissue. If ulcers develop as a result of prostaglandin deficiency, the normal tissue could counteract by increasing the concentrations of prostaglandin E+A to start the proliferation phase.

4068 SOMATOSTATIN INHIBITS INSULIN-STIMULATED GASTRIN RELEASE AND GASTRIC SECRETION OF ACID, PEPSIN, AND INTRINSIC FACTOR (IF) IN DUODENAL ULCER PATIENTS. (Eng.) Schrumpf, E.; Vatn, M. H.; Hanssen, K. F.; Semb, L. S.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(5):517-520; 1976.

The effect of somatostatin (0.6 mg/hr) on insulin-stimulated gastrin release and gastric acid, pepsin, and intrinsic factor (IF) secretion was examined in six unoperated patients with duodenal ulcer. Insulin (0.15 IU/kg, i.v.)-stimulated acid, pepsin, and IF levels (89 ± 6 mEq/l, 1,064 ± 83 mg/l, and 54 ± 10 U/ml, resp.) were decreased by the simultaneous administration of somatostatin (46 ± 5 mEq/l, $p<0.01$; 999 ± 108 mg/l; and 58 ± 4 U/ml; resp.). Plasma gastrin was also significantly lower after somatostatin infusion. The results indicate that somatostatin inhibits insulin-induced gastrin release and gastrin secretion.

4069 SECRETIN-INDUCED HISTAMINE RELEASE IN DUODENAL-ULCER PATIENTS. (Eng.) Baenkler, H. W.; Mitznegg, P.; Domschke, S.; Wunsch, E.; Subramanian, N.; Domschke, W.; *et al.* (Univ. Erlangen-Nurnberg, Universitatsstrasse 22, 8520 Erlangen, W. Germany). *Lancet* 1(8018):928-929; 1977.

Because many duodenal ulcer patients develop an anaphylactoid skin reaction after the intradermal administration of secretin, skin samples from seven patients with duodenal ulceration and six patients with goiter or cholelithiasis were incubated with tris buffer alone and with tris buffer containing 20 clinical units (CU)/ml synthetic secretin or 100 μg/ml of compound 48/80, which is known to induce histamine release from mast cells. Skin from duodenal ulcer patients released significantly more histamine after secretin treatment than did that of controls (the histamine content induced by secretin was 65.1 ± 27.3% of the initial content in the ulcer patients versus 34.9 ± 6.0% in the controls, $p<0.01$). Histological examination of skin samples from these patients showed that the number of histamine-containing mast cells averaged 5-7 per field and dropped to 1-2 per field after incubation with secretin. It is concluded that, in a certain type of duodenal ulceration, intradermal secretin releases histamine from mast cells and thus induces a local anaphylactic reaction. This reaction might prove suitable for preclinical ulcer diagnosis and/or for detection of patients at risk of acquiring that disease.

4070 GASTROINTESTINAL EFFECTS OF LONG-TERM TREATMENT OF DUODENAL ULCER WITH DEPOT SECRETIN: CLINICAL, SECRETORY, ULTRA-STRUCTURAL, AND ENZYMOLOGICAL ASPECTS. (Eng.) Demling, L.; Domschke, W.; Riemann, J. F.; Domschke, S.; Ruppin, H.; Junge, O.; Wunsch, E. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Scand. J. Gastroenterol.* 11(42):135-145; 1976.

The effects of a long-acting secretin (10 U/kg s.c., b.i.d. for 1 week, daily thereafter) on three men with duodenal ulcers were studied over a period of 4 weeks. Patients reported improvement in epigastric pain as early as 2 days after onset of treatment, and, as shown by duodenoscopy, the ulcers healed completely after 2 weeks in one patient and after 3 weeks in the other patients. Gastric fluid and acid production were not affected by treatment. Pancreatic fluid and bicarbonate production were unchanged compared to pretreatment values. Similarly, intestinal disaccharidase activity remained constant, as did the activities of the dipeptide hydrolases, alkaline phosphatase, and enterokinase. The authors suggest that long-acting secretin has therapeutic potential in healing duodenal ulcers.

4071 PREVENTION AND TREATMENT OF GASTRIC AND DUODENAL ULCERS IN RENAL TRANSPLANT PATIENTS. (Fre.) Launois, B.; Campion, J. P.; Gosselin, M.; Cartier, F. (C.H.U. de Rennes, Hopital Pontchaillou, rue Henri-Le-Guillous, F 25011 Rennes, France). *Gastroenterol. Clin. Biol.* 1(1):23-27; 1977.

Treatment with systemic antacids of 79 renal transplant patients (55 men, 24 women; average age 33.7 yr) for prevention of gastroduodenal ulcers is described. Immunosuppressive therapy consisted of antilymphocytic globulins (10 mg/kg/day i.v. for 10 days than 252 mg/day i.m.), azathioprine (1-2 mg/kg/day), and prednisone (1 mg/kg/day). In patients that rejected transplants, prednisone was supplemented by methylprednisolone (1 g at 48-hr intervals). These drugs were administered with 5.7 g aluminum phosphate or 1 g aluminum hydroxide and 1.19 g magnesium hydroxide daily. Only two subocclusive accidents were attributed to the antacids. However, hyperphosphotemia, greater than 4.5 mg, was noted in 33 patients. No ulcer recurrences were noted in any of the 79 patients. Autopsy in 14/16 patients who died within 1 yr of transplant revealed ulcer complications or acute ulcer in 2. The percentage of ulcer complications in this group was 2.1%, whereas a 5.2% rate is the usual prevalence rate in renal transplant patients.

4072 GASTRIC AND DUODENAL ULCER HEALING UNDER PLACEBO TREATMENT. (Eng.) Scheurer, U.; Witzel, L.; Halter, F.; Keller, H. M.; Huber, R.; Galeazzi, R. (c/o Dr. Charles Code, Veterans Admin. Center, Building 115, Los Angeles, CA 90073). *Gastroenterology* 72(5):838-841; 1977.

The healing time relation of 30 gastric and 15 duodenal ulcers was assessed by repeated endoscopic measurements of ulcer size on days 1, 21, and 42 of a 6-week period, during which a selected population of patients was being treated with a placebo. Antacids in small amounts were only given in case of ulcer pain. There was a linear relation between the absolute initial ulcer size and its reduction with time in incompletely healed ulcers of both types. The percentage reduction from the original size was 71% after 3 weeks in gastric ulcers and 83% in 3 weeks in duodenal ulcers; after 6 weeks, the reductions were 82% and 83%, resp., for the two ulcer types. The healing time course for both types of ulcers followed an exponential function. The calculated half-life was 1.7 weeks for gastric and 1.9 weeks for duodenal ulcers. The number of healed duodenal ulcers observed at the 3-week examination was significantly greater than that of healed gastric ulcers ($p=0.05$). It is concluded that repeated measurements of the ulcer size before complete ulcer healing contribute to an optimal characterization of the healing time course. The calculated half-life of less than 2 weeks makes shorter control intervals reasonable for both types of ulcers. The ulcer half-life appears to be a more accurate criterion of the healing process than is the half-life of complete healing.

4073 24-HOUR INTRAGASTRIC ACIDITY AND NOCTURNAL ACID SECRETION IN PATIENTS WITH DUODENAL ULCER DURING ORAL ADMINISTRATION OF CIMETIDINE AND ATROPINE. (Eng.) Pounder, R. E.; Hunt, R. H.; Vincent, S. H.; Milton-Thompson, G. J.; Misiewicz, J. J. (St. Thomas' Hosp., London SE1 7EH, England). *Gut* 18(2):85-90; 1977.

The possibility that anticholinergic therapy concomitant with cimetidine therapy increases the effect of cimetidine was investigated by measuring the 24 hr intragastric acidity and nocturnal output of acid in four duodenal ulcer patients, each receiving on separate occasions, p.o. cimetidine (1 g/day) and placebo, atropine (2.4 mg/day) and placebo, cimetidine and atropine, or two placebos. Cimetidine alone decreased the mean hourly hydrogen ion activity by 63% of control values, decreased the mean hourly hydrogen ion concentration (total acid) by 41%, inhibited nocturnal acid secretion by 83%, and resulted in half the nocturnal samples being anacidic. Atropine treatment alone had no effect when compared with the controls, and combined treatment with both drugs was not superior to cimetidine alone. Atropine did not affect the absorption of or urinary excretion of cimetidine. Fasting serum gastrin concentrations were not changed by any of the treatments. The combination of cimetidine with an anticholinergic appears to offer no advantage over treatment with the H_2-antagonist alone. Cimetidine is the only potent antisecretory drug that does not cause acute side-effects, and this important advantage would be lost if it were given with a maximal dose of an anticholinergic.

4074 EFFECT OF TRUNCAL VAGOTOMY ON GASTRODUODENAL CONTENT OF GASTRIN. (Eng.) Malmstrom, J.; Stadil, F.; Christensen, K. C. (Rigshospitalet, 2100 Copenhagen, Denmark). *Br. J. Surg.* 64(1):34-38; 1977.

The vagal influence on gastroduodenal gastrin content was studied in duodenal ulcer patients before and after truncal vagotomy. Endoscopic biopsies were assayed for total gastrin concentrations. Antral concentration was 17.0 ± 2.0 μg gastrin/g mucosa in 52 unoperated patients compared with 25.2 ± 3.2 μg in 32 vagotomized patients. In 14 patients studied before and 3 months after vagotomy, antral content was almost doubled (10.9 ± 2.3 and 20.4 ± 2.9 μg resp.; in the duodenal bulb the concentration was 2.4 ± 0.3 μg in 37 unoperated patients and 2.2 ± 0.4 μg in 19 vagotomized patients. In six patients in whom measurements were made throughout the duodenum, gastrin concentrations were significantly lower 3 months after vagotomy. Fractionations of pooled homogenates on Sephadex G-50 showed that gastrin component III (gastrin-17) made up 95% of the antral gastrins before and after operation. In the duodenum, component III constituted over half of the gastrins preoperatively, but only one-third postoperatively. The total amount of gastroduodenal gastrin was considerably increased by vagotomy, and it is well established that in serum the gastrin concentration is also higher postoperatively. The most likely explanation of these findings is that in man, the vagus, directly or indirectly, suppresses gastrin production.

4075 STOMACH CANCER FOLLOWING SURGERY FOR GASTRODUODENAL ULCER: A REPORT OF EIGHT CASES. (Fre.) Francillon, J.; Forest, G.; Tissot, E.; Baudet, B.; Vignal, J. (No affiliation given). *Chirurgie* 103(3):157-168; 1977.

Stomach cancer developed in eight men operated on for gastrointestinal ulcers 4.5-31 yr previously. Initially, the patients had duodenal (3), pyloric (1), or gastric (3) ulcers, and underwent gastrectomy (5) or gastroenteranastomosis (3). The ulcer site was unknown in one patient. Prior to detection of stomach cancer, the patients complained of vomiting, anorexia, weight loss, asthenia, hematemesis, and melena. Most of the tumor specimens were well-differentiated, anaplastic adenocarcinoma. They were situated at the mouth of the anastomosis, on the upper stomach (1), at the antrum (3), or over the entire stomach (1). Of the eight patients, four died 1-16 months after surgery, whereas one patient died of uncontrollable hemorrhage immediately after surgery. Three patients survived and were in good health at a 3-yr follow-up.

4076 ROENTGENO-ENDOSCOPIC INVESTIGATION OF GASTRIC ULCERS IN ELDERLY AND SENILE PERSONS. (Rus.) Ganchenko, L. I.; Mayorov, V. M. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (6):21-27; 1976.

4077 PREDICTIVE VALUE OF PEROPERATIVE GASTRIC ACID TESTS. (Eng.) Hood, J. M.; Spencer, E. F. A.; MacRae, K. D.; Kennedy, T. (Royal Victoria Hosp., Belfast, Northern Ireland). *Gut* 17(12):998-1000; 1976.

4078 PREOPERATIVE ELUCIDATION OF CAUSES OF PEPTIC ULCER FORMATION FOLLOWING PARTIAL GASTRECTOMIES. (Rus.) Sakharov, M. I.; Slepukha, A. G.; Myasnikova, A. G. (Dept. General Surgery, Sverdlovsk Medical Inst., Sverdlovsk, USSR). *Khirurgiia (Mosk.)* (11):18-24; 1976.

4079 PROGRESS IN THE TREATMENT OF ACUTE GASTRODUODENAL MUCOSAL LESIONS (AGML). (Eng.) Speranza, V.; Basso, N. (Via Montemignaio 60, 00189 Rome, Italy). *World J. Surg.* 1(1):35-46; 1977.

4080 MARGINAL ULCER: A GUIDE TO MANAGEMENT. (Eng.) Passaro, E., Jr.; Gordon, H. E.; Stabile, B. E. (Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *Surg. Clin. North Am.* 56(6):1435-1444; 1976.

4081 CHANGING TRENDS IN THE SURGICAL TREATMENT OF DUODENAL ULCER. (Eng.) Goligher, J. C. (General Infirmary at Leeds, Leeds, England). *Klin. Wochenschr.* 54(19):937-945; 1976.

4082 EFFECT OF MINERAL WATER "GALYCHANKA" ON THE COURSE OF ULCER DISEASE, CHRONIC GASTRITIS AND CHRONIC CHOLECYSTITIS. (Rus.) Neiko, E. M.; Chemerinsky, V. D.; Droniuk, R. I.; Serediuk, N. N.; Romaniv, N. B.; Debenko, M. V.; *et al.* (Dept. Therapy, Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (12):63-65; 1976.

4083 TRITHIOZINE (ISF 2001): GASTRIC ANTISECRETORY EFFECTS AND TREATMENT OF PEPTIC ULCER. (Eng.) Pellegrini, R.; Abbondati, G. (I.S.F. Italseber, Trezzano S/N, Milano, Italy). *Farmaco [Prat.]* 31(10):483-494; 1976.

4084 EFFECTS OF TRITHIOZINE (ISF 2001) ON DUODENAL ULCER: A CONTROLLED DOUBLE BLIND TRIAL. (Eng.) Bereti, I. (State Hosp., Paradfurdo, Hungary). *Farmaco [Prat.]* 31(10):495-501; 1976.

4085 THE GENETICS OF PEPTIC ULCER DISEASE--SEGREGATION OF SERUM GROUP I PEPSINOGEN CONCENTRATIONS IN FAMILIES WITH PEPTIC ULCER DISEASE. [Abstract]. (Eng.) Rotter, J. I.; Rimoin, D. L.; Gursky, J. M.; Samloff, I. M. (UCLA-Harbor General Hosp., Torrance, CA). *Clin. Res.* 25(2):114A; 1977.

4086 FAMILIAL AGGREGATION OF PEPTIC ULCERS AND ISCHAEMIC HEART DISEASE. COMMON ETIOLOGIC FACTORS? (Eng.) de Faire, U.; Dyckner, T.; Rehnqvist, N. (Dept. Medicine, Serafimerlasarettet, 112 83 Stockholm, Sweden). *Acta Hepatogastroenterol.* 24(1):38-40; 1977.

4087 PATHOGENESIS OF PEPTIC ULCER. (Rus.) Burchinskii, G. I.; Kushnir, V. E.; Kosenko, A. F. (Dept. Therapy, Kiev Medical Inst., Kiev, USSR). *Klin. Med. (Mosk.)* 54(7):53-57; 1976.

4088 PATHOGENESIS OF DUODENAL ULCER: EFFECT OF PROPIONITRILE AND CYSTEAMINE ON GASTRIC EMPTYING IN THE RAT [Abstract]. (Eng.) Szabo, S.; Lichtenberger, L. M.; Haith, L. R., Jr.; Reynolds, E. S. (Peter Bent Brigham Hosp., Boston, MA 02115). *Fed. Proc.* 35(3):393; 1976.

4089 DUODENAL ULCERS PRODUCED IN RATS BY INDOMETHACIN COMBINED WITH BENZYL ALCOHOL [Abstract]. (Eng.) Robert, A.; Nezamis, J. E.; Lancaster, C.; Hanchar, A. J. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI 49001). *Fed. Proc.* 36(3):595; 1977.

4090 EVIDENCE FOR INCREASED ACID EXPOSURE OF THE DUODENUM IN PATIENTS WITH DUODENAL ULCER [Abstract]. (Eng.) Dubois, A.; Smithson, K. W.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(3):310A; 1977.

4091 REFLECTIONS ON THE PATHOLOGIC ANATOMY OF THE LIVER IN CHRONIC GASTRODUODENAL ULCER AND ITS SURGICAL TREATMENT. EXPERIENCE IN 50 CASES. (Spa.) Escriva Escriva, J.; Escriva Escriva, C.; Guillem Luengo, J.; de Juan Burgueno, M. (Ciudad Sanitaria de la Seguridad Social "La Fe," Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(3):327-340; 1976.

4092 PEPSIN 1 SECRETION, CIGARETTE SMOKING, AND CHRONIC PEPTIC ULCERATION [Abstract]. (Eng.) Walker, V.; Taylor, W. H. (Liverpool Area Health Authority, England). *Clin. Sci. Mol. Med.* 52(2):15p; 1977.

4093 CORRELATION BETWEEN NEURO-HUMORAL AND LOCAL MECHANISMS OF REGULATION OF THE SECRETORY FUNCTION OF THE STOMACH IN PATIENTS WITH GASTRIC AND DUODENAL ULCER. (Rus.) Saakyan, A. G.; Shvarts, V. Ya. (Dept. Postgraduate Medical Studies in Balneology, Piatigorsk Scientific Res. Inst. Balneology and Physiotherapy, Piatigorsk, USSR). *Klin. Med. (Mosk.)* 54(10):38-43; 1976.

4094 POSTVAGOTOMY DIARRHEA. (Eng.) Storer, E. H. (Veterans Admin. Hosp., West Haven, CT 06516). *Surg. Clin. North Am.* 56(6):1461-1468; 1976.

4095 CHRONIC DUODENITIS IN PATIENTS WITH DUODENAL ULCER. (Rus.) Uspensky, V. M.; Stefanenko, Yu. F.; Akimov, N. P. (Dept. Therapy, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Med. (Mosk.)* 54(10):55-60; 1976.

4096 DYNAMICS OF AMINO ACID COMPOSITION OF BLOOD IN PATIENTS WITH PYLORIC STENOSIS. (Rus.) Grechishkin, D. K.; Zaporozhets, V. K. (Clinic Surgery, Voroshilovgrad Medical Inst., Voroshilovgrad, USSR). *Khirurgiia (Mosk.)* (10):78-82; 1976.

See also, 3673, 3686, 3714, 3717, 3876, 3897, 3989, 4047, 4058, 4063, 4064, 4065, 4242, 4396.

4097 EFFECT OF ANTIDIARRHEAL AND ANTIMOTILITY DRUGS ON ILEAL EXCRETA. (Eng.) Kramer, P. (Univ. Hosp., 75 East Newton St., Boston, MA 02118). *Am. J. Dig. Dis.* 22(4):327-332; 1977.

Six ileostomized patients received antimotility and antidiarrheal drugs (codeine sulfate, 15 mg q.i.d.; deodorized tincture of opium, 12 drops q.i.d.; diphenoxylate, 5 mg q.i.d.; propantheline, 15 mg q.i.d.; tincture of belladonna, 1 ml q.i.d.; Sorboquel, 1 tablet q.i.d.; kaopectate, 30 ml, frequency not reported; bismuth subgallate, 1 g q.i.d.; and calcium carbonate, 2 g q.i.d.) to determine whether their normal ileal excreta and that induced by prune juice could be altered. A total of 49 studies were performed, 21 with and 28 without prune juice (200 g/day). Bismuth subgallate was the only drug that significantly reduced the normal ileal excreta ($p<0.05$); this decrease ranged from 8 to 13%. Codeine sulfate decreased the ileal excreta in two of three subjects in either type of study. The third subject was a nonresponder to drugs. Deodorized tincture of opium and diphenoxylate were also effective in some subjects. Calcium carbonate increased ileal excreta and fat excretion.

4098 DESCRIPTIVE EPIDEMIOLOGY OF SMALL-BOWEL ATRESIA IN METROPOLITAN ATLANTA. (Eng.) Safra, M. J.; Oakley, G. P.; Erickson, J. D. (Center for Disease Control, Public Health Service, Atlanta, GA 30333). *Teratology* 14(2):143-150; 1976.

The epidemiological characteristics of 46 cases of congenital small bowel atresia in Atlanta, Georgia are reported. The incidence rate was 2.7/10,000 live births. Three occurrences of the malformation, all duodenal lesions, were in infants with Down's syndrome, one was in an infant with cystic fibrosis, and ten were in infants with other major anomalies apparently morphogenetically unrelated to small bowel atresia. The remaining 32 infants were considered to have isolated small bowel atresia. Seven of the infants with isolated small bowel atresia are known to have died by 1 yr of age (fatality ratio of 21.9%). The defect was significantly associated ($p<0.001$) with low birth-weight. Among the 32 cases of isolated small bowel atresia, 19 infants, including 6 of the 7 that died, weighed less than 2,500 g at birth. Isolated small bowel atresia showed no sex predilection. The defect occurred twice as frequently in blacks (3.1/10,000 livebirths) as in whites (1.4/10,000), with the difference being due to a higher than expected incidence in black females (4.6/10,000). The incidence of the defect was highest in the winter months. Duodenal lesions occurred in 31%, jejunal lesions in 41%, ileal lesions in 13%, and other or unspecified lesions in 16% of the 32 isolated small bowel atresia cases. Except for the association of Down's syndrome with duodenal atresia, no specific patterns of associated anomalies were seen for either duodenal or jejunoileal atresia. The inability to divide the atresias into two clearly distinct epidemiological groups on the basis of lesion location is perhaps an indication of the heterogeneity of both groups of disorders with respect to etiology and pathogenesis.

4099 PRIMARY DUODENAL CARCINOMA WITH PROTEIN-LOSING ENTEROPATHY. (Eng.) Mangla, J. C.; Taylor, E.; Cristo, C. (Monroe Community Hosp., 435 E. Henrietta Rd., Rochester, NY 14603). *Am. J. Gastroenterol.* 67(1):73-76; 1977.

The case is reported of a patient with a primary duodenal carcinoma and protein-losing enteropathy. The patient, a 71-yr-old man, presented with weakness and edema; a mass in the head of the pancreas that was presumptively diagnosed as carcinoma had been previously found. Gastroscopy showed an ulcerated lesion in the duodenum that subsequently proved to be a primary carcinoma with marked lymphangiectasia. The total protein level was 4.3 g/100 ml, and the albumin level was 1 g/100 ml. The Zollinger-Ellison syndrome was ruled out by normal gastrin levels. Radioactive albumin studies revealed 10% albumin excretion in a 96-hr stool collection. It was decided that these studies should be repeated with continuous nasogastric aspiration in order to exclude the possibility of protein loss from gastric mucosa. However, the patient died from a pulmonary embolus before the test was repeated. Autopsy revealed duodenal adenocarcinoma, pancreatic atrophy, anasarca, and generalized arteriosclerosis. There was no significant hypertrophy of the gastric mucosa or any evidence of ulceration. It seems likely that the protein loss occurred from the duodenal carcinoma.

4100 GASTROINTESTINAL AND METABOLIC FUNCTION IN PATIENTS WITH THE CARCINOID SYNDROME. (Eng.) Feldman, J. M.; Plonk, J. W. (Box 2963, Duke Univ. Medical Center, Durham, NC 27710). *Am. J. Med. Sci.* 273(1):43-54; 1977.

Gastrointestinal absorption was studied in six consecutive patients with metastatic serotonin-secreting carcinoid tumors. One patient had a consistent defect in fat absorption, and two other patients malabsorbed fat during spontaneous or dopamine-induced exacerbation of the carcinoid syndrome. The steatorrhea of the patient with the persistent defect in fat absorption was reduced when tumor serotonin production was reduced by parachlorophenylalanine. The six patients had normal hemoglobin levels, and the serum concentration of the following urinary constituents was normal in most of the patients: albumin, carotene, 25-hydroxycalciferol, parathyroid hormone, calcitonin, calcium, phosphorous, osteogenous alkaline phosphatase, cholesterol, triglycerides, and serum lipoproteins. The excretion of the following urinary constituents was also normal in most of the patients: creatinine clearance, tubular reabsorption of phosphorus, calcium, D-xylose, cyclic adenosine 3'5'-monophosphate, and hydroxyproline. Patients with the carcinoid syndrome may have steatorrhea, and their hyperserotoninemia plays a role in this process.

4101 ANGIOGRAPHIC FINDINGS IN CARCINOID TUMORS OF THE SMALL INTESTINE (TWO CASES). (Fre.) Pistolesi, G. F.; Caresano, A.; Del Favero, C.;

Frasson, F.; Fugazzola, C. (Service de Radiologie, Centre Hospitalier et Universitaire, 37100 Verona, Italy). *J. Radiol. Electrol. Med. Nucl.* 57(10):725-731; 1976.

The advantages of using angiography (AN)-(versus conventional radiology) in the diagnosis of carcinoid tumors (CT) were evaluated in two patients, and compared to findings reported in the literature. Clinically, both patients presented with marked hepatomegaly, fever, diarrhea, dyspepsia, and anorexia. In the first patient, barium transit showed no organic lesions. A second barium transit revealed an endoluminal lacunar image. In the second patient, this procedure showed only ulceration of the intestines. AN in both patients, however, revealed a reduction in the diameter of the mesenteric trunk and middle right colic branches, plus interruption of the marginal arterial branches. Multiple hypervascular metastases of part or all of the liver were seen. Surgery and histology confirmed the presence of CT. There is no overall agreement in the literature concerning the angiographic appearances of CT. The small haphazardly arranged arterial vessels, indicative of primary intestinal neoplasms, are not always visible, and the accumulation of contrast medium is generally discrete. The degree of vascularization of CT also varies. Often reflux is totally absent or, at least, not intense. The first patient demonstrated discrete intratumor vascularization but only a small accumulation of contrast medium at the parenchymatous stage. The second patient showed a rounded nodule with distinct borders that was opacified at the periphery. Nevertheless, AN is recommended over barium passage, since it can reveal information on the nature of these lesions.

4102 SILENT PYLORO-DUODENAL GASTRINOMAS: REPORT OF THREE CASES. (Fre.) Berger, G.; Patricot, L. M.; Guillard, M. T.; Beurlet, J.; Frappart, L.; Vauzelle, J. L. (Hopital cardiologique, B. P. Lyon Montchat, 69394 Lyon Cedex 3, France). *Ann. Anat. Pathol. (Paris)* 22(1):5-20; 1977.

Three cases of silent pyloro-duodenal gastrinomas that secreted gastrin but did not evoke clinically the Zollinger-Ellison syndrome are reported. In two women, aged 48 and 60 yr, the tumor developed in the submucosa of the duodenal bulb. It appeared in the submucosa of the pyloro-bulbar region in a 73-yr-old woman. The patients presented with epigastric pain, dyspepsia, nausea, or diarrhea. Endoscopy confirmed the presence of the benign tumors that were excised by gastrectomy or pylorotomy. Two of the three tumor specimens were ulcerated. Histiochemistry showed endocrine secretion granules and the silver staining technique of Grimelius revealed argyrophile granules in a large number of tumor cells, which may correspond to the neurosecretory granules observed ultrastructurally in the tumor cells of one patient. Immunofluorescence detected immunoreactive gastrin in most of the tumor cells of all three patients. Apparently these tumors arise from the gastrin cells of the mucosa or from their precursors. The detection of immunoreactive gastrin in the cells is the main diagnostic tool.

4103 INTRAMURAL HEMATOMAS OF THE DIGESTIVE TRACT COMPLICATING ANTICOAGULANT THERAPY. TWO NEW CASES (ONE DUODENO-JEJUNAL, THE OTHER ILEOCECAL) CURED BY INTESTINAL RESECTION. (Fre.) Reynier, J.; Merlat, M.; Aurousseau, R.; Bernard, J. L.; Grossetti, D.; Monod, R.; Chollier, A. (Hopital Boucicaut, 78, rue de la Convention, 75730 Paris Cedex 15, France). *Ann. Chir.* 31(2):169-176; 1977.

The results of surgery for intramural hematoma (IH) of the small intestine in a 47-yr-old woman and a 65-yr-old man, both on long-term therapy with dicoumarol, are presented. IH was characterized by severe abdominal pain in both patients accompanied by nausea and vomiting that progressed to an occlusive syndrome. In the first patient, IH was localized in the duodenum and jejunum, and it was treated by segmental duodenojejunectomy followed by duodenojejunal anastomosis. A radiological examination 6-months postoperatively showed a normal intestinal transit and absorption. In the second patient, IH occurred in the ileum and cecum and was treated by right hemicolectomy. Previously, the patient suffered a myocardial infarction and was treated with acenocoumarol that was resumed postoperatively together with heparin. At 3-months follow-up, the patient was in good condition with radiological evidence of satisfactory function of the anastomosis.

4104 MEDITERRANEAN LYMPHOMA (DIFFUSE IMMUNOBLASTIC SMALL INTESTINAL LYMPHOMA) WITHOUT IgA ABNORMALITY. (Fre.) Galian, A.; Scotto, J.; Rouffy, J.; James, J. M.; Lenormand, Y.; Rambaud, J. C. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75475 Paris Cedex 10, France). *Gastroenterol. Clin. Biol.* 1(1):49-58; 1977.

A case of Mediterranean lymphoma (diffuse immunoblastic small intestine lymphoma) without IgA abnormality is reported in a 22-yr-old Algerian man. The patient had a 6-yr history of abdominal pain and diarrhea. He presented with cachexia, edema of the legs, pleural and pericardial effusions, an abdominal mass, and enlarged axillary nodes. Biological tests revealed a malabsorption syndrome, but no serum immunoglobulin abnormalities. Biopsy of the pleura revealed sarcomatous cells and a biopsy of the axillary nodes confirmed the existence of a malignant lymphoma. The patient deteriorated rapidly and died of a widespread hemorrhagic syndrome. Microscopy revealed immunoblast proliferation, which had infiltrated the entire small intestinal wall and had destroyed the normal axillary and mesenteric lymph node architecture. Portal triads and serous effusions also contained immunoblasts, a few of which tended to plasmocyte differentiation. Immunofluorescence revealed no intracytoplasmic immunoglobulin. It is suggested that, besides alpha-chain disease, Mediterranean lymphoma also includes other histological types of diffuse intestinal lymphomas.

4105 INTESTINAL LYMPHANGIECTASIA. (Fre.) Rosenberg, D.; Peytel, J.; Floret, D.; Monnet, P. (Hopital Edouard-Herriot, 69003, Lyon, France). *Pediatrie* 31(8):795-802; 1977.

A case of intestinal lymphangiectasia in an infant girl and a 3-yr follow-up are presented. At birth the girl presented with subpubic edema; she was hospitalized at 1 month of age. At 4.5 months, edema was pronounced as a result of moderate ascites; gastrointestinal symptoms included diarrhea and steatorrhea. Biological tests confirmed exudative enteropathy that led to a diagnosis of intestinal lymphangiectasia with characteristic features of hypoproteinemia, hypocalcemia, and lymphocytopenia. An ascites tap revealed chylous liquid indicative of anomalies of the lymph duct. Of three jejunal biopsies, only the first showed type II-III atrophy. Lymphangiectasia was not apparent at the level of the villi; however, biopsies were not performed in the submucosa. Lymphangiography was normal and radiological and isotope studies showed protein loss into the gastrointestinal tract. Treatment with medium chain triglycerides reduced edema and weight loss; however, in the long term had no curative effect on steatorrhea and persistent biological changes. Growth retardation and immune deficiency did not improve.

4106 MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE LIVER FOLLOWING SMALL INTESTINAL BYPASS FOR OBESITY.

(Eng.) Solhaug, J. H.; Gluck, E. (Dept. Surgery, Haukeland Hosp., Bergen, Norway). *Scand. J. Gastroenterol.* 11:793-800; 1976.

Studies were made to correlate the histological changes in liver structure with changes in liver function after an ileo-bypass operation for the treatment of obesity in six patients. Liver biopsies of one man and five women were obtained at the time of jejuno-ileal bypass and compared with liver biopsies obtained at 6, 12, and 18 months after the operation. The extent of fatty changes, cellular infiltration, connective tissue infiltration, and parenchymal cell damage was recorded. The weight loss in all patients followed a similar pattern, with an initial rapid loss in the immediate postoperative period and a nearly exponential loss up to 12 and 18 months after the operation. Increasing steatosis and hepatic cellular damage were found in all patients during the period of most rapid weight loss. With reduced rate of weight loss the steatosis decreased, and eventually a nearly complete clearing of fatty infiltration occurred. Preoperatively, none of the applied function tests was able to reveal the concomitant changes in liver histology. Postoperatively, the BSP retention test and the glutamylpyruvic transaminase activity in serum nearly paralleled the increased fatty infiltration and the hepatic cellular damage seen in the biopsies. No correlation was seen in serum γ-glutamyl transpeptidase activity, alkaline phosphatase activity, or total bilirubin level, or in the galactose elimination test except in one patient who postoperatively developed serious liver damage and cirrhosis. These tests, therefore, were useless in predicting actual morphological changes. The results indicate that the bypass operation may be followed by considerable changes in liver morphology that are reflected only to a minor degree by standard liver function tests. To detect concurrent morphological changes necessitating additional therapy, repeated liver biopsies are recommended after the operation.

4107 INTESTINAL ADAPTATION AFTER JEJUNO-ILEAL BYPASS OPERATION FOR MASSIVE OBESITY.

(Eng.) Iversen, B. M.; Schjonsby, H.; Skagen, D. W.; Solhaug, J. H. (Medical Dept. A, Univ. Bergen, Bergen, Norway). *Eur. J. Clin. Invest.* 6(5):355-360; 1976.

Intestinal adaptation was studied in six patients with massive obesity who were treated by jejuno-ileal bypass operation. Surgery consisted of bypass of the major part of the small intestine with an end-to-end anastomosis between the proximal 20 cm of the jejunum and the distal 25 cm of the ileum. At a glucose concentration of 66 mM, the mean glucose absorption rate (as measured by a perfusion technique) 6 months after surgery (472 μmol/min/0.2 m jejunum) was not significantly different from the mean absorption rate before surgery (395 μmol/min/0.2 m jejunum). However, at a glucose concentration of 133 mM, the mean glucose absorption rate increased significantly ($p<0.025$) from a preoperative value of 651 to a postoperative value of 1,011 μmol/min/0.2 m jejunum. Mean lactase activity was significantly increased in the jejunum (27.0 ± 11.0 before and 47.5 ± 13.0 U/g protein after surgery, $p<0.025$) and in the ileum (4.2 ± 3.9 before and 18.5 ± 6.4 U/g after surgery, $p<0.005$) 6 months after surgery, whereas the mean sucrase activity did not change significantly. There was a significant increase in the mean villus height in the jejunum (451 ± 97 μ before and 559 ± 164 μ after surgery, $p<0.025$) and in the ileum (441 ± 102 μ before and 609 ± 156 μ after surgery, $p<0.05$) 6 months after surgery; but the epithelial cell height and width were unchanged in both the jejunum and the ileum, suggesting that the operation resulted in epithelial cell hyperplasia. The mean crypt length did not change in the jejunum but showed a significant increase in the ileum (121 ± 36 μ before and 169 ± 1 μ after surgery, $p<0.05$). There was a significant correlation between glucose absorption and villus height in the jejunum when the glucose concentration in the perfusate was either 66 mM ($r=0.69$) or 133 mM ($r=0.76$), suggesting that the increased glucose absorption was related to an increased number of epithelial cells.

4108 BILE SALT METABOLISM FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY.

(Eng.) Stein, T. A.; Wise, L. (Washington Univ. Sch. Medicine, St. Louis, MO). *Ann. Surg.* 185(1):67-72; 1977.

Bile salt pool size and kinetics were evaluated in eight women with morbid obesity (mean weight, 124.4 ± 16.3 kg) before and after jejunoileal bypass. The operation consisted of an end-to-end anastomosis of 35 cm of proximal jejunum to 10 cm of terminal ileum and an end-to-end side anastomosis of the excluded segment of small bowel to the cecum. Preoperative glycocholic acid pool size, turnover rate/day, and loss/day values were 1.38 ± 0.32 g, 0.85 ± 0.60, and 0.97 ± 0.64 g, resp., as compared with corresponding postoperative values of 0.56 ± 0.38 g, 5.87 ± 4.57, and 2.77 ± 2.36 g, resp. All of these changes were significant ($p<0.01$). Preoperative glycochenodeoxycholic acid pool size, turnover rate/day, and loss/day values were 0.90 ± 0.25 g, 0.67 ± 0.53, and 0.56 ± 0.37 g, resp., as compared with postoperative values of 0.42 ± 0.27 g, 3.70 ± 2.79, and 1.15 ± 0.86 g, resp. ($p<0.01$, $p<0.01$, and $p<0.05$, resp.). The results indicate that glycocholic acid metabolism was altered more than glycochenodeoxycholic acid metabolism after jejunoileal bypass, with the chenodeoxycholate pool decreasing less than the cholate pool in spite of greater cholate synthesis. Although all patients received identical surgery, the effect on bile salt kinetics and pool sizes varied among the patients. It is suggested that the long-term effects of jejunoileal bypass on bile salt metabolism and the associated complications of the procedure are dependent on the individual patient's capability for increased hepatic synthesis of bile salts and on the adaptability of the remaining small bowel for increased reabsorption of bile salts.

4109 FUNCTIONAL INTESTINAL OBSTRUCTION DUE TO DEFICIENCY OF ARGYROPHIL NEURONES IN THE MYENTERIC PLEXUS: FAMILIAL SYNDROME PRESENTING WITH SHORT SMALL BOWEL, MALROTATION, AND PYLORIC HYPERTROPHY.

(Eng.) Tanner, M. S.; Smith, B.; Lloyd, J. K. (Hosp. for Sick Children, Grant Ormond St., London, England). *Arch. Dis. Child.* 51(11):837-841; 1976.

Three case reports are described of infants with a syndrome of pyloric hypertrophy, short small intestine, malrotation, and functional obstruction of the bowel due to peristaltic failure associated with faulty development of the myenteric plexus. The main histological features of the syndrome are: the failure of ganglion cell fall-out, which normally occurs around birth, along with the presence of too many neurons in the ganglia, the presence of many neuronal nuclei which have the clumped chromatin characteristic of neuroblasts, and the absence or reduction of intrinsic argyrophil ganglion cells and their processes. In one case, the abnormality of motility associated with the absence of the argyrophil plexus was demonstrated radiologically where to-and-fro movement of barium in the upper small bowel was clearly seen. The motility was also reflected as a markedly delayed transit time. The diagnosis of the syndrome of argyrophil neuron deficiency is unlikely to be made before laparotomy unless a previous child has been affected. The marked thickening of the bowel wall is indicative of the underlying neural abnormality; and, if an ileostomy is performed, it is possible, without added risk, to obtain 2-3 cm of ileum upon which a histological diagnosis may be made. In the absence of the argyrophil plexus, ongoing peristalsis cannot be effected by pharmacological stimulation of either the nerve cells or the muscle fibers, and the condition is thus incompatible with life. Thus, long periods of i.v. nutrition seem inappropriate. A review of the above three cases along with four previously reported cases of infants with similar clinical features reveals that in this small group there were two pairs of siblings and one other child who was the product of a doubly consanguineous marriage; these facts strongly suggest that the disorder is inherited as an autosomal recessive.

4110 SCLEROSING PERITONITIS DUE TO PRACTOLOL.

(Eng.) Thompson, R. P. H.; Jackson, B. T. (St. Thomas Hosp., London SE1, England). *Br. Med. J.* 1(6073):1393-1394; 1977.

Six patients are discussed who developed intestinal obstruction from sclerosing peritonitis after practolol treatment. All patients (aged 55-63 yr) were treated with practolol (100 mg, 3-4 times/day) for angina or paroxysmal tachycardia. Ocular and skin changes caused by the drug occurred in all patients. All patients presented with symptoms of obstruction that were not relieved by conservative treatment. Four patients also had a palpable abdominal mass caused by a matted small intestine cocooned in the characteristic fibrous membrane. Repeated laparotomies, causing infection and conventional postoperative adhesions, confused the characteristic appearances and made recognition and removal of the membrane difficult in one patient. In this patient, the fibrous membrane was not restricted to a cocoon around the small bowel, but also caused large bowel peritoneal thickening and colonic obstruction. The membrane extended onto the large bowel in three further patients and onto the stomach in two of these. There was no gastric or large bowel obstruction in these three patients. A pleural effusion developed in one patient and pleural thickening occurred in two others. Complete stripping of the membrane was carried out in all patients. The symptoms completely resolved in three patients, one of whom has been followed for 16 months after surgery; three patients have mild abdominal symptoms. Sclerosing peritonitis should be considered in all patients with subacute intestinal obstruction who have taken practolol.

4111 ENDOSCOPIC POLYPECTOMY FROM THE AFFERENT DUODENAL LOOP.

(Eng.) Roberts, G. S.; Lobis, I. F.; Gennaro, A. R.; Lorber, S. H. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Gastrointest. Endosc.* 22(3):172-173; 1976.

4112 RENAL TUBULAR DYSFUNCTION SECONDARY TO JEJUNOILEAL BYPASS.

(Eng.) Vainder, M.; Kelly, J. (Peterson Doctors Bldg., 2424 W. Peterson, Chicago, IL 60659). *JAMA* 235(12):1257-1258; 1976.

4113 COLONIZATION OF JEJUNUM BY ENTEROBACTERIA AND MALABSORPTION IN PATIENTS WITH GIARDIASIS [Abstract].

(Eng.) Tomkins, A. M.; Wright, S. G.; Drasar, B. S.; James, W. P. T. (Hosp. Tropical Diseases, London, England). *Gut* 17(5):397; 1976.

4114 ENTEROBACTERIACEAE IN THE JEJUNAL MICROFLORA: PREVALENCE AND RELATIONSHIP TO BIOCHEMICAL AND HISTOLOGICAL EVALUATIONS IN HEALTHY COLOMBIAN MEN. (Eng.) Cain, J. R.; Mayoral, L. G.; Lotero, H.; Bolanos, O.; Duque, E. (Tulane Univ. Sch. Medicine, New Orleans, LA 70112). *Am. J. Clin. Nutr.* 29(12):1397-1403; 1976.

4115 GAS GANGRENE INFECTIONS OF THE SMALL INTESTINE, COLON AND RECTUM. (Eng.) Hitchcock, C. R.; Bubrick, M. P. (Hennepin County Medical Center, Fifth and Portland South, Minneapolis, MN 55415). *Dis. Colon Rectum* 19(2):112-119; 1976.

4116 INTESTINAL ABSORPTION OF VITAMIN E IN THE INFANT OF LOW BIRTH WEIGHT. (Fre.) Caldera, R.; Olive, G.; Kersaudy, L.; Rossier, A. (Hopital Saint Vincent de Paul, 74, avenue Denfert Rochereau, F 75674 Paris Cedex 14, France). *Nouv. Presse Med.* 5(32):2057-2059; 1976.

4117 WATER-SALT METABOLISM IN PATIENTS WITH INTESTINAL FISTULAS. (Rus.) Vittsyn, B. A.; Yudaev, I. Yu. (Clinic Surgery, Novosibirsk Medical Inst., Novosibirsk, USSR). *Khirurgiia (Mosk.)* (10): 82-85; 1976.

4118 WALDEYER'S HERNIA. (Eng.) Azouz, E. M.; Doyon, M. (Le Centre Hospitalier de l'Universite Laval, 2705 Boulevard Laurier, Quebec, Quebec, Canada G1V 4G2). *J. Can. Assoc. Radiol.* 27(2):108-110; 1976.

4119 ISCHAEMIC DISORDERS OF THE DIGESTIVE SYSTEM. (Eng.) Saegesser, F.; Robinson, J. W. L. (Dept. Surgery, Sch. Medicine, Lausanne, Switzerland). *Abdom. Surg.* 18(3):69-72; 1976.

4120 VOLVULUS OF THE SMALL BOWEL. (Eng.) De Souza, L. J. (St. Louis Park Medical Centre, Minneapolis, MN 55416). *Br. Med. J.* 1(6017):1055-1056; 1976.

4121 STRUCTURAL AND FUNCTIONAL CHANGES IN THE SMALL INTESTINE DUE TO ACUTE DUODENAL OBSTRUCTION. (Rus.) Popov, V. A. (Clinic of Navy and Hospital Surgery, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Eksp. Khir. Anesteziol.* (4): 56-59; 1976.

4122 ESOPHAGEAL MOTOR DYSFUNCTION IN 11 PEDIATRIC PATIENTS WITH CHRONIC IDIOPATHIC INTESTINAL PSEUDO-OBSTRUCTION SYNDROME (CIIPS) [Abstract]. (Eng.) Byrne, W. J.; Euler, A. R.; Ippoliti, A. F.; Ament, M. E. *In: The American Pediatric Society and The Society for Pediatric Research Combined Program and Abstracts* (San Francisco, California):p. 441; 1977.

4123 INTESTINAL NECROSIS AND PERFORATION IN PATIENTS RECEIVING IMMUNOSUPPRESSIVE DRUGS. (Eng.) Matolo, N. M.; Garfinkle, S. E.; Wolfman, E. F., Jr. (Univ. California Sch. Medicine, Davis, CA 95616). *Am. J. Surg.* 132(6):753-754; 1976.

4124 JUVENILE GASTROINTESTINAL POLYPOSIS. (Eng.) Schwartz, A. M.; McCauley, R. G. K. (Tufts-New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Radiology* 121(2):441-444; 1976.

4125 THE USE OF INTRAMUSCULAR PROPANTHELINE IN THE SHORT BOWEL SYNDROME. (Eng.) Cameron, J. L.; Gayler, B. W.; Hendrix, T. R. (Johns Hopkins Hosp., Baltimore, MD 21205). *Johns Hopkins Med. J.* 138(3):91-95; 1976.

4126 DUODENAL VARICES. (Eng.) Richardson, J. D.; McInnis, W. D.; Pestana, C. (Univ. Texas Health Science Center, 7703 Floyd Curl Drive, San Antonio, TX 78284). *Am. Surg.* 42(3):201-203; 1976.

4127 INTESTINAL LESIONS PRODUCED BY PREDNISOLONE: PREVENTION BY 16,16-DIMETHYL PROSTAGLANDIN E_2 [Abstract]. (Eng.) Lancaster, C.; Robert, A. (Experimental Biology, Upjohn Co., Kalamazoo, MI 49001). *Fed. Proc.* 36(3):1020; 1977.

4128 GASTROINTESTINAL HEMORRHAGE FROM A JEJUNAL ULCER ATTRIBUTABLE TO THE TAKING OF COMPRESSED POTASSIUM CHLORIDE TABLETS. (Fre.) Soprani, A.; Claret, Y.; Louvel, A. (Hopital Cochin, 27, rue du Fg Saint Jacques, 75675 Paris, France). *Nouv. Presse Med.* 5(39):2634-2635; 1976.

See also, 3586, 3589, 3627, 3655, 3657, 3690, 3716, 3836, 3867, 3871, 3872, 3877, 3879, 3880, 3882, 3931, 3933, 3973, 3985, 3996, 3997, 4027, 4038, 4056, 4079, 4095, 4132, 4136, 4138, 4163, 4175, 4185, 4195, 4258, 4385, 4389, 4391, 4393, 4406, 4407, 4410, 4415, 4417, 4437, 4452, 4455, 4473, 4475.

Malabsorption

4129 RELATIONSHIP BETWEEN CHANGES IN INTRALUMINAL PRESSURE AND TRANSMURAL POTENTIAL DIFFERENCE IN THE HUMAN AND CANINE JEJUNUM IN VIVO.

(Eng.) Read, N. W.; Smallwood, R. H.; Levin, R. J.; Holdsworth, C. D.; Brown, B. H. (Dept. Medicine, Univ. Sheffield, Sheffield S10 2TN, England). *Gut* 18(2):141-151; 1977.

The possibility that the fluctuation in transmural potential difference (PD) seen in the human jejunum *in situ* is related to intestinal motility was tested by recording the transmural PD and intraluminal pressure at the same site in both the proximal jejunum in conscious humans and jejunal loops of conscious dogs. In 25 of 31 subjects (7 normal controls and 24 patients under investigation for malabsorption, 6 of whom had celiac disease), a clear association between these fluctuations and changes in intraluminal pressure was observed. The most frequent PD changes were associated with type III pressure waves. These consisted predominantly of large waves (3.1 ± 0.1 mV, mean ± SEM, n=317) that reached maximal amplitude approximately 45 sec after the pressure peak and had a duration of 120 ± 3 sec, but also included less frequent spikes (0.5 ± 0.1 mV, n=110) concurrent with the pressure wave with a duration of 5 ± 1 sec. Although the type III pressure waves appeared to be propagated aborally at a median rate of 60 cm/min at two sites in the jejunum, the apparent rates of propagation of the corresponding PD waves were much more variable. The largest PD changes (7.8 ± 0.4 mV, n=19), lasting several minutes, were found in association with runs of type I waves (basic rhythm) superimposed on a type III wave. Both pressure and PD activities were suppressed by i.m. propantheline bromide. Intraluminal pilocarpine caused a transient rise in PD not always accompanied by a change in pressure. Distension of the jejunum by rapid injection of a bolus of isotonic sodium chloride produced a delayed rise in the PD that could be prevented by prior administration of propantheline bromide. Experiments using Thiry-Vella loops of proximal jejunum in conscious dogs confirmed the effect of jejunal distension on the PD and also demonstrated that spontaneous retching is preceded by an increase in the PD. It is proposed that the larger spontaneous fluctuations in transmural PD in the jejunum of conscious man are caused by changes in electrogenic secretion associated with intestinal motility and mediated by cholinergic mechanisms. The possible association of increased secretory activity with motility may have functions of lubrication as well as diluting and mixing the chyme for easier digestion and absorption.

4130 USE OF PEROXIDASE-LABELLED ANTIBODIES FOR ULTRASTRUCTURAL LOCALIZATION OF IMMUNOGLOBULINS IN NORMAL AND COELIAC INTESTINAL MUCOSA.

(Eng.) Labbe, F.; Labbe, J. P.; Jos, J. (Hopital des Enfants-Malades, 149 Rue de Sevres, 75730 Paris Cedex 15, France). *In: Immunoenzymatic Techniques. Proceedings of the First International Symposium on Immunoenzymatic Techniques, held in Paris, 2-4 April, 1975.* (New York: American Elsevier): INSERM Symposium No. 2, pp. 281-290; 1976.

Peroxidase-labeled rabbit anti-human α-chain antibody was used in the ultrastructural localization of IgA in duodenojejunal biopsies from normal controls and from children with active celiac disease. Peroxidase-labeled goat anti-mouse IgA and free peroxidase solution were used as controls. Satisfactory penetration of the peroxidase-conjugated antibodies occurred after 24 hr of fixation in 4% formaldehyde at 4 C, followed by incubation of thick frozen sections in the labeled antibody for 16 hr at 4 C or 5 hr at 20 C with continuous stirring. Electron microscopy of normal mucosae revealed many IgA plamsa cells with antibody, which appeared as dense depositis of reaction product, in the perinuclear space and in the endoplasmic reticulum. The mucosae of children with active celiac disease differed from that of the controls in having an increased number of IgA plasma cells with heavy deposits of reaction product on the basement membrane of the surface epithelial cells and the wall of blood vessels. The results confirm that the pathway of mucosal production and secretion of IgA is that IgA produced by plasma cells is transported through the basement membrane of crypt and surface epithelium into the intercellular spaces where, after combination with the secretory piece to form 11 S IgA, it enters the lower part of the epithelial cells before reaching the intestinal lumen.

4131 FAMILIAL ASPECTS OF COELIAC DISEASE. (Eng.)

Stokes, P. L.; Ferguson, R.; Holmes, G. K. T.; Cooke, W. T. (Waikato Hosp., Hamilton, New Zealand). *Q. J. Med.* 45(180):567-582; 1976.

The incidence of celiac disease was determined among first-degree relatives of 115 patients with this disease, and the question of whether any symptom or laboratory finding other than jejunal biopsy could be used in the diagnosis was investigated. The index cases ranged between 9 and 75 yr old. Of 324 relatives, 182 underwent jejunal biopsy; 41 had celiac disease. One-third were asymptomatic, but all had at least one abnormal result among the laboratory indices used. Twenty-two percent of the relatives with a hemoglobin level less than 13.0 g; 43% with a serum folate level less than 3.0 pg/ml; and 24% with a serum albumin level less than 4.0 g/100 ml, serum iron less than 60 μg/100 ml, or with serum alkaline phosphatase above 13 King-Armstrong U had celiac disease. Less than 5% of the relatives with histocompatibility (HLA) antigens other than HLA 8 had celiac disease compared with one in four of those with HLA 8. The high percentage of relatives with HLA 8 antigens or with anticonnective tissue antibodies among those with nonspecific biopsy appearances suggests that these groups also contain a number of relatives with varying degrees of gluten intolerance.

4132 SUGAR ABSORPTION BY SMALL BOWEL BIOPSY SAMPLES FROM PATIENTS WITH PRIMARY LACTASE DEFICIENCY AND WITH ADULT CELIAC DISEASE. (Eng.) Beck, I. T.; Dinda, P. K.; Da Costa, L. R.; Beck, M. (Hotel Dieu Hosp., Queen's Univ., Kingston, Ontario K7L 3H6, Canada). *Am. J. Dig. Dis.* 21(11):946-952;

The absorption of 3-*O*-methyl-D-glucose (3MG) by jejunal biopsies from three normal human subjects was compared with that by everted rings of hamster (n=8) and rat (n=8) jejunum. Also, sugar absorption by human jejunal biopsies from three normal patients was compared with that by jejunal biopsies from five patients with primary lactase deficiency and five patients with adult celiac disease. The affinity of carrier for 3MG (the apparent K_m) did not differ significantly among normal humans, hamsters, and rats. The capacity of 3MG carriers (the V_{max}) was similar in normal humans and hamsters, but significantly lower in rats. The apparent K_m for 3MG transport was identical in normal and lactase-deficient subjects; the V_{max} for 3MG was substantially, but not significantly, higher in the lactase-deficient patients. Michaelis-Menten kinetics were not observed in patients with celiac sprue. Since the intercellular 3MG concentration in these biopsies exceeded the 3MG concentration in the incubation medium, active transport with low saturation kinetics was inferred. This phenomenon suggests that, in celiac sprue, the number of sugar carrier molecules is diminished and that those that do exist have reduced sugar affinity. The latter condition improved in some patients after treatment with a gluten-free diet.

4133 THREE-DIMENSIONAL RECONSTRUCTION OF JEJUNAL BIOPSY IN TROPICAL SPRUE. (Eng.) Mehta, S. K.; Chakravarti, R. N. (Postgraduate Inst. Medical Education and Res., Chandigarh, India). *Am. J. Dig. Dis.* 22(3):223-229; 1977.

A three-dimensional clay model was constructed of a jejunal biopsy from a patient with tropical sprue. The model was constructed from paper tracings of 350 10-μm serial sections of the jejunum. Morphology of villi varied throughout the biopsy segment from a normal appearance to grossly abnormal. Abnormalities of villi are described, including changes in shape, indicating atrophy; infiltration with inflammatory cells; fusion; an increase in goblet cells; and alterations in epithelial cells. Biopsy from a second patient with tropical sprue confirmed these observations.

4134 ENDEMIC TROPICAL SPRUE IN RHODESIA. (Eng.) Thomas, G.; Clain, D. J. (Dept. Medicine, Univ. Rhodesia, Salisbury, Rhodesia). *Gut* 17(11): 877-887; 1976.

Thirty-one cases of tropical sprue were reported in Rhodesia during a 15-month period from among 48 patients with megaloblastic anemia and 3 patients with diarrhea and weight loss. The patients presented with a high incidence of anemia (81%, hemoglobin levels were 2.7-11.7 g), weakness (83%), dyspnea (77%), weight loss (71%), diarrhea (48%), abdominal pain (48%), anorexia (48%), and malnutrition. Electrolyte depletion and hypoalbuminemia occurred frequently. Some patients were grossly dehydrated, and one had osteomalacia. Glossitis and stomatitis were observed in one patient each. No jejunal biopsies were normal, and all showed villous stunting and chronic inflammatory cell infiltrate. Malabsorption of fat, xylose (<5.0 g), and vitamin B_{12} (<0.75%) were found in all patients. Gastric involvement consisting of atrophic (6 cases) or chronic gastritis (7 cases), achlorhydria (10 cases), or hypochlorhydria (14 cases) occurred in 75% of patients. Low overall incidence of steatorrhea (40%) was explained by the inadequate fat content of the diets early in the study. Therapy consisted of tetracycline (250 mg, q.i.d.) alone or in combination with folic acid (5 mg, t.i.d.) and vitamin B_{12} (1,000 μg/month for 6 months) or vitamin B_{12} and folic acid for 6 months followed by tetracycline for 6 months. Clinical and hematological recovery of all patients, with increases of serum albumin, folic acid, and vitamin B_{12} values occurred with tetracycline therapy alone in nine patients, with no change of home diet. One patient died after 3 weeks of treatment. No incidence of relapse occurred on completion of treatment. It is suggested that the search for tropical sprue should not be confined to humid coastal areas, but should encompass the whole continent of Africa.

4135 TROPICAL ENTEROPATHY IN RHODESIA. (Eng.) Thomas, G.; Clain, D. J.; Wicks, A. C. (Dept. Medicine, Univ. Rhodesia, Salisbury, Rhodesia). *Gut* 17(11):837-924; 1976.

The occurrence of tropical enteropathy in Rhodesia is examined. Jejunal abnormalities were reported in Rhodesians of all social and racial categories. Xylose malabsorption was related to socioeconomic circumstances, but not to race. Upper socioeconomic-level Africans and Europeans excreted significantly ($p<0.001$) more xylose (7.2 g) than lower socioeconomic-level Africans (5.4 g). However, no difference between urban and rural Africans of lower socioeconomic status was reported. Vitamin B_{12} and fat absorption were normal, suggesting predominant involvement of the proximal small intestine. It is suggested that repeated gastrointestinal infections or some other environmental factors (diet and sanitation) might be responsible for tropical enteropathy.

4136 SARCOIDOSIS AND WHIPPLE'S DISEASE. ASSOCIATION? CORRELATION? (Fre.) Pequignot, H.; Morin, Y.; Grandjouan, S.; Guerre, J.; Liot, F.; Deslignieres, S.; Duflo, B. (Clinique medicale, Hopital Cochin, 27, rue du Faubourg-Saint-Jacques, F75674 Paris Cedex 14, France). *Ann. Med. Interne (Paris)* 127(11):797-806; 1976.

Based on experience with a patient with sarcoidosis and Whipple's disease, a possible relationship between the two disorders is discussed. A literature review of 54 cases of Whipple's disease with pleuropulmonary lesions made it possible to associate numerous examples of extraintestinal involvement in the latter. The histological appearance of a nonspecific epithelioid granuloma does not indicate a diagnosis of Whipple's disease during the long preintestinal phase. On the other hand, the presence of pleuropulmonary lesions leads to an initial diagnosis of probable sarcoidosis. It is suggested that the appearance of sarcoidosis should be followed by intestinal or mesenteric node biopsy to seek macrophages with a highly PAS-positive cytoplasm characteristic of Whipple's disease, whose discovery requires long-term antibiotic therapy.

4137 IMMUNOLOGICAL ASPECTS OF WHIPPLE'S DISEASE: REPORT OF 4 CASES WITH AN IMMUNOFLUORESCENT STUDY OF THE SMALL INTESTINE. (Fre.) Le Bodic, L.; Le Bodic, M. F.; Delumeau, G.; Hamza, H.; Prost, A.; Leportz, J.; Lenne, Y.; Mussini-Montpellier, J. (Laboratoire d'Anatomie Pathologique, Faculte de Medecine, 1, rue Gaston-Veil, F 44035 Nantes Cedex, France). *Gastroenterol. Clin. Biol.* 1(1):9-21; 1977.

Humoral and cellular immunity serum studies as well as histological, ultrastructural, and immunofluorescent studies of the small intestine were performed in four patients with Whipple's disease. Clinically, all patients presented with arthralgia, diarrhea, adenopathy and sometimes skin pigmentation. Elevated serum IgA levels that returned to normal after treatment (unspecified) were observed in two patients. Conversely, decreased serum IgM levels were noted in two patients. Immunofluorescent studies of biopsy material of the small intestine revealed normal concentrations of immunocytes, but abnormal distribution, since IgA immunocytes were decreased and IgG immunocytes increased. After 6 months of treatment, the number of intestinal IgA immunocytes increased and surpassed normal levels. Disorders of cellular immunity were much more marked and persisted during antibiotic (unspecified) treatment. Although total number of lymphocytes were decreased in only one patient, the E rosette test remained lower than normal before and after treatment in all four patients. Diminished response to delayed skin hypersensitivity tests and lymphocyte transformation by phytohemagglutinin were also observed. Decreased cellular immunity may be directly responsible for Whipple's disease.

4138 DRUG ABSORPTION IN GASTROINTESTINAL DISEASE WITH PARTICULAR REFERENCE TO MALABSORPTION SYNDROMES. (Eng.) Parsons, R. L. (Guy's Hosp. Medical Sch., St. Thomas St., London SE1 9RT, England). *Clin. Pharmacokinetics* 2(1):45-60; 1977.

4139 MINIMAL FORM OF CELIAC DISEASE IN THE ADULT. RADIOLOGIC STUDY OF THE DUODENO-JEJUNUM AND PER ORAL SMALL INTESTINAL BIOPSY. (Fre.) Debray, C.; Cerf, M.; Marche, C.; Le Canuet, R.; Kallal. (Hopital Bichat, 170, boulevard Ney, 75877 Paris Cedex 18, France). *Sem. Hop. Paris* 52(34):1847-1850; 1976.

4140 IMPAIRED SECRETIN RELEASE IN COELIAC DISEASE [Abstract]. (Eng.) O'Connor, F. A.; McLoughlin, J. C.; Buchanan, K. D. (Dept. Medicine, Queen's Univ. Belfast, Northern Ireland). *Clin. Sci. Mol. Med.* 52(2):16P; 1977.

4141 ROLE OF GLUTEN, PREDNISONE, AND AZATHIOPRINE IN NON-RESPONSIVE COELIAC DISEASE. (Eng.) Hamilton, J. D.; Chambers, R. A.; Wynn-Williams, A. (McMaster Univ. Medical Center, Hamilton, Ontario L8S 4J9, Canada). *Lancet* 1(7971): 1213-1216; 1976.

4142 HEREDITARY FRUCTOSE INTOLERANCE. CLINICAL AND BIOCHEMICAL STUDY. (Fre.) Lacroix, A.; Benoit, R.; Theroux, P.; Pesant, P.; Matte, R. (Hopital Saint-Luc, 1058, rue Saint-Denis, Montreal, Canada). *Union Med. Can.* 105(12):1803-1809; 1976.

4143 SMALL INTESTINE β-GALACTOSIDASE DEFICIENCY AND ITS ENZYMATIC THERAPY. (Rus.) Shershevsky, M. G.; Nishchiy, V. A.; Belyaevskaya, L. A.; Kupchik, A. G.; Tikhomirova, A. S.; Feniksova, R. V.; *et al.* (Second Dept. Therapy, Novokuznetsk Inst. Postgraduate Medical Studies, Novokuznetsk, USSR). *Vopr. Pitan.* (6):54-57; 1976.

4144 THE GENETIC BASIS OF GLUTEN-SENSITIVE ENTEROPATHY (GSE) [Abstract]. (Eng.) Strober, W.; Pena, A. S.; Hague, N. E.; Heck, J. A.; Goodenberger, D. M.; Mann, D. L. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 25(3):469A; 1977.

4145 MALDIGESTION OF LACTOSE FROM AQUEOUS SOLUTIONS AND FROM WHOLE MILK: STUDIES USING A HYDROGEN (H_2) BREATH TEST [Abstract]. (Eng.) Solomons, N. W.; Garcia, R.; Viteri, F. E. (Div. Human Nutrition and Biology, Inst. Nutrition Central America and Panama, Guatemala City, Guatemala). *Clin. Res.* 25(3):318A; 1977.

4146 METABOLIC AND HORMONAL RESPONSES TO A PROTEIN-GLUCOSE MEAL IN NORMAL INFANTS AND IN MARASMUS AND MARASMIC KWASHIORKOR. (Eng.) Graham, G. G.; Nakashima, J.; Thompson, R. G.; Blizzard, R. M. (615 North Wolfe St., Baltimore, MD 21205). *Pediatr. Res.* 10(10):832-843; 1976.

See also, 3867, 4000, 4001, 4002, 4003, 4099, 4104, 4108, 4113, 4180, 4408, 4410, 4412, 4413.

4147 INTESTINAL BACTERIAL FLORA OF PATIENTS WITH COLONIC DISEASE. STUDY OF SAMPLES OBTAINED BY COLONOSCOPY. (Fre.) Boisson, J.; Brisou, J.; Brangier, J. (Hopital du Bon-Secours, 75014 Paris, France). *Sem. Hop. Paris* 53(13/14): 837-831; 1977.

Intestinal bacterial flora was obtained by colonoscopy of 16 patients with chronic colonic disease. There were seven patients with functional colonic disorders and nine patients with mucous lesions such as rectal polyps, hemorrhoidal rectorrhagia, sigmoid diverticulosis, Hodgkin's disease, Crohn's disease, and hemorrhagic rectocolitis. No one bacteria was identified with any one disease, because the most seriously affected patients had varied bacteria. Overall, 750 bacterial strains were found and some *Candida* strains. Patients with irritable bowel syndrome had a predominance of proteolytic *Pseudomona*. The patient with Hodgkin's disease had an abundance of *Streptococcus faecalis* associated with *S. aureus* and five species of *Pseudomonadas*. One patient with rectorrhagia had at least 10 species of the latter strain. None of the patients were on antibiotic therapy. No bacterial sensitivity study was done due to the mass of bacteria isolated and identified.

4148 HUMAN RECTAL MUCOSA: PROCTOSCOPIC AND MORPHOLOGICAL CHANGES CAUSED BY LAXATIVES. (Eng.) Meisel, J. L.; Bergman, D.; Graney, D.; Saunders, D. R.; Rubin, C. E. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Gastroenterology* 72(6):1274-1279; 1977.

To determine whether laxatives alter the proctoscopic and morphological appearances of the human rectum, 10 normal subjects were studied prospectively, and the following manipulations were assessed in a randomized, blinded manner: no treatment, oral mannitol to induce diarrhea, isotonic saline enema, Fleet's Phospho-Soda enema, and bisacodyl (10 mg) by enema or suppository. Proctoscopy was carried out within 10 min after defecation of each test substance. The rectal mucosa after mannitol-induced diarrhea, or after saline enema could not be distinguished from untreated rectum by proctoscopy, light microscopy, or scanning electron microscopy. Fleet's enema and bisacodyl invariably changed proctoscopic appearances and frequently altered light and scanning microscopic aspects. Both Fleet's enema and bisacodyl caused sloughing of surface epithelium. In addition, light microscopy revealed that bisacodyl decreased the uptake of hematoxylin and eosin by crypt epithelial cells in 16 of 25 cases, so that the affected cells had a partially erased appearance. The lamina propria of 3 of these 25 biopsies contained polymorphonuclear cells. Transmission electron microscopy revealed that the abnormal crypt epithelial cells contained fewer cytoplasmic organelles and less nuclear chromatin. All lesions resolved within 7 days. Fleet's enema and bisacodyl by rectum may mislead the proctologist and the pathologist by altering normal rectal mucosa.

4149 RECTAL WALL BLEEDING--AN OVERLOOKED SOURCE OF MASSIVE LOWER GASTROINTESTINAL HEMORRHAGE. (Eng.) Thomson, J. G.; Gold, R. E.; Grace, D. M.; Passi, R. B. (Univ. Hosp., London, Ontario N6G 2K3, Canada). *J. Can. Assoc. Radiol.* 28(2): 142-145; 1977.

Two cases of rectal bleeding are presented in which the diagnosis was made angiographically. In the first patient, a 59-yr-old woman, sigmoidoscopy demonstrated bleeding above 25 cm. Angiography of the inferior mesenteric artery from the upper rectum to the splenic flexure showed several areas of aneurysm dilatation in the middle colic artery, but the bleeding site was not seen. Subsequent arteriography of the superior mesenteric artery also showed no bleeding site. A further inferior mesenteric arteriogram that had been unintentionally lower revealed the bleeding site 3 cm proximal to the mucocutaneous junction. In the second patient, a 41-yr-old woman, sigmoidoscopy demonstrated no lesion, but blood was seen coming from above 20 cm. Arteriography was performed, and care was taken to include the entire anorectal region on the films despite the sigmoidoscopic findings. Selective inferior mesenteric artery injection showed that the bleeding site was about 4 cm above the mucocutaneous junction. As in the first patient, the site of hemorrhage was a branch of the left superior rectal artery. Care must be taken to include the entire rectum on films obtained during inferior mesenteric artery injection, regardless of the sigmoidoscopic findings.

4150 ARTERIAL EMBOLIZATION IN THE TREATMENT OF MASSIVE GASTROINTESTINAL HEMORRHAGE: USE IN A CASE OF PERSISTENT RECTAL BLEEDING FOLLOWING RECTAL POLYPECTOMY. (Fre.) Franck, P.; Tongio, J.; Wenger, J. J.; Cinqualbre, J.; Dupeyron, J. P. (No affiliation given). *Chirurgie* 103(2):45-50; 1977.

Arterial embolization was used in the treatment of rectal bleeding in a 30-yr-old man following rectal polypectomy. Initially the patient presented with rectorrhagia, liquid diarrhea, fever, and weight loss. Rectoscopy and barium enema revealed diffuse generalized rectocolic polyposis. Biopsies confirmed benign adenomatous polyps and the patient underwent total colectomy. A later polypectomy of the rectum was followed by massive rectal bleeding. Selective arteriography demonstrated the artery responsible for the bleeding, which stopped immediately after embolization with pieces of sponge mixed with Thrombase and the patient's blood. Control arteriography showed that the clots in the embolized artery as well as the extravasations had disappeared. Control rectoscopy after 1 month revealed normal rectal mucosa.

4151 BARIUM ENEMA, PROCTOSIGMOIDOSCOPY AND UPPER GASTROINTESTINAL SERIES IN THE PREOPERATIVE EVALUATION OF THE CANCER PATIENT. (Eng.) Bagley, D. H.; Felix, E. L.; Sindelar,

W. F.; Doppman, J. L.; Ketcham, A. S. (Yale Univ. Sch. Medicine, New Haven, CT 06437). *Cancer* 39(4): 1743-1747; 1977.

The findings on routine upper gastrointestinal series, barium enema, and proctosigmoidoscopy in 566 patients over a 5-yr period were reviewed to determine their value in the preoperative evaluation in cancer patients. Routine upper gastrointestinal series was performed in 453 patients, barium enemas in 490, and proctosigmoidoscopies in 342. No metastases or second primary malignancies were detected by the upper gastrointestinal series, but the extent of large intra-abdominal tumors were delineated. Barium enema and proctosigmoidoscopy together revealed three unsuspected primary colonic tumors (1.2% in patients over 50 yr of age). Sigmoidoscopy and examination of the stool for occult blood would have revealed the same patients. Barium enema may be limited to surgical cancer patients in whom the extent of local tumor invasion is to be defined and to older patients in whom colonic tumors are suspected. Neither upper gastrointestinal series nor barium enema appear to be of value as a routine preoperative screening test in surgical cancer patients.

4152 THE ROLE OF INTRACAVITARY IRRADIATION IN THE CURATIVE TREATMENT OF CARCINOMA OF THE RECTUM: 170 CASES.

(Fre.) Papillon, J. (12, quai du General Sarrail, F 69006 Lyon, France). *Nouv. Presse Med.* 6(4):250-254; 1977.

The results of the treatment of 170 cases of rectal cancer by intracavitary radiotherapy (contact radiotherapy and interstitial curietherapy) are presented. All patients had well-differentiated invasive adenocarcinomas. Contact radiotherapy was given in 2-min intervals over 4-6 weeks; curietherapy was usually given as adjunct therapy. Of the 170 patients, 126 survived 5 yr and were considered clinically cured of their cancer; 5 of these patients had surgery for local recurrences. Forty-four patients died, 19 of progression of the cancer, 22 of intercurrent disease, and 3 after surgery for adenopathy of the rectal sheath (1) and for falsely suspected scar formation. This ambulatory method of radiotherapy is safe and is recommended for patients who are elderly or whose condition is fragile.

4153 COLONIC TUMORS FOLLOWING URETEROSIDMOIDOSTOMY FOR EXSTROPHY OF THE BLADDER: CLINICAL AND ANATOMICAL STUDY OF TWO CASES.

(Fre.) Potet, F.; Weiss, A. M.; Soullard, J.; Cendron, J. (Hopital Beaujon, F 92110 Clichy, France). *Gastroenterol. Clin. Biol.* 1(1):59-65; 1977.

Two cases of colonic tumors arising in a man and woman approximately 25 yr after ureterosigmoidostomy for exstrophy of the bladder are presented. Exstrophy of the bladder was performed in the man at 7 yr of age; 25 yr later a biopsy obtained rectoscopically revealed an adenocarcinoma of the right ureter, which recurred on the left ureter 1 yr later. Two cystic polyps developed at the orifices of the ureters in a 34-yr-old woman, 25 yr after surgery for exstrophy. Anatomic pathological examination of the different lesions showed almost identical features. In the first case, two tumor lesions developed successively; in the second case, the two tumors developed simultaneously. Histologically, the tumors had the features of typical juvenile polyps. The entire polyp was comprised of cystic formations. The stroma was edematous, congestive, and infiltrated with inflammatory cells. Urologic and gastrointestinal follow-up are recommended in such patients.

4154 COLITIS IN CHILDREN WITH THE HEMOLYTIC-UREMIC SYNDROME.

(Eng.) Tochen, M. L.; Campbell, J. R. (Univ. Oregon Health Sciences Center, 3181 S. W. Sam Jackson Park Rd., Portland, OR 97201). *J. Pediatr. Surg.* 12(2):213-219; 1977.

The cases of four children with hemolytic-uremic syndrome in combination with colitis are presented. The patients (3 girls and 1 boy) ranged in age from 10 months to 3 yr. All four patients had bloody diarrhea which was associated in three cases with vomiting. The hemolytic-uremic syndrome was characterized by hemolytic anemia, renal failure, and thrombocytopenia. Submucosal hemorrhage with "thumbprinting" on roentgenographic examination of the colon with barium was demonstrated in all four patients, rectal prolapse in two patients, and pseudomembranous enterocolitis and toxic megacolon in one. A partial colectomy and temporary colostomy, hemodialysis, and kidney transplant were required in this latter patient. The presence of the described colonic symptoms in a child with bloody diarrhea should suggest hemolytic-uremic syndrome. Sigmoidoscopy and barium enema examination should be carried out in selected patients with this syndrome to evaluate the degree of colonic involvement and the need for surgery.

4155 RADIOLOGICAL ASPECTS OF ISCHEMIC COLITIS. STUDY OF EIGHT CASES.

(Fre.) Benacerraf, R.; Delage, Y.; Blery, M.; Bismuth, V. (Service de radiologie, Hopital Louis Mourier, 178 rue de Renouilliers, 92700 Colombes, France). *Ann. Radiol. (Paris)* 19(5):495-504; 1976.

The radiological aspects of ischemic colitis in eight patients are presented. Two patients died of advanced disease. One had total necrotic ischemia of the rectosigmoid and died 1 month after surgery following an occlusion syndrome associated with stenosis of the left colon. Autopsy revealed vast hemorrhagic ulcerations of the entire rectum. The other died of mesenteric infarction associated with lesions of the small intestine and right colon. Clinically, five patients presented with bloody diarrhea and abdominal pain; one patient also had an occlusion plus a perforation. Radiologically, two patients showed gaseous distension of the small intestine. Barium enema revealed four localizations at the left colic angle, two at the rectosigmoid, and one at the sigmoid only; in one patient, the right colon and the end of small intestine were involved.

Ulcerations were also evident in three of eight patients, and tubular stricture of the colon was seen by barium enema in four. Arteriography did not present much information, but it did reveal vascularization, preferentially of the internal part of the colon wall next to the lumen in two patients. The diagnosis of ischemic colitis was established on the basis of the coincidence of several factors: age, vascularization, abdominal pain, rectorrhagea, radiological signs, the anatomopathological examination in four cases, and the evolution of the disease.

4156 RECTOPLASTY WITH POSTERIOR TRIANGULAR COLONIC FLAP--A RADICAL NEW OPERATION FOR HIRSCHSPRUNG'S DISEASE. (Eng.) Kasai, M.; Suzuki, H.; O'hi, R.; O'htomo, S. (Tohoku Univ. Sch. Medicine, 1-1, Seiryo-Cho, Sendai, Japan). *J. Pediatr. Surg.* 12(2):207-211; 1977.

Rectoplasty with a posterior triangular colonic flap was carried out in 15 patients with Hirschsprung's disease; this procedure was developed to eliminate the anastomotic leakage sometimes encountered in rectal myotomy with colectomy. The posterior wall of the rectum is split in the midline, and both angles are trimmed off. The colon is divided at the level where it has been demonstrated to have normal ganglion cells, and is split along its taenia libera and both angles are cut off to make a triangular flap. The incision of the posterior wall of the rectum is extended through the dentate line, cutting the upper half of the internal sphincter, and the triangular colonic flap is pulled down through the rectum and colorectal anastomosis is started from below. The patients ranged from 3 months to 10 yr, and follow-up after this procedure ranged from 2 months to 7 yr. The clinical evaluation of bowel habit was excellent in 12 patients, fair in 1 (occasional incontinence), and poor in 1. The remaining patient was too young for assessment of continence. Rectal sensation was satisfactory in 12 of 14 patients older than 2 yr. Postoperative manometric studies revealed a positive rectoanal reflex in 9 of 11 patients; recto-anal reflex was negative in the remaining 2 cases that were assessed as fair or poor in bowel habit.

4157 SEROLOGIC DETECTION OF PERSONS AT RISK IN FAMILIAL POLYPOSIS COLI. (Eng.) Vargish, T.; Dawkins, H. G., Jr.; Heise, E.; Myers, R. T. (Bowman Gray Sch. Medicine, Wake Forest Univ., Winston-Salem, NC). *Surg. Forum* 26:403-405; 1975.

Attempts were made to identify members at risk in a 47-member family in which at least seven members have polyposis coli. Thirty-nine members are living. Eight members had carcinoma with polyposis, three had carcinoma with presumed polyposis, and four had polyposis alone. ABO blood groups and HL-A genotypes were determined in 28 members and eight spouses; carcinoembryonic antigen (CEA) levels were determined in 26 members. Seven members with polyposis carry the same HL-A haplotype (11-W5); this haplotype is presumed (on the basis of HL-A studies of their children) in three members who died of colonic cancer. The 11-W5 haplotype is present in three members examined clinically and found free of disease, and in five members not yet clinically examined. One member with polyposis lacks this 11-W5 haplotype. There was no correlation between the presence of polyposis and ABO blood group antigens or CEA level. HL-A typing and genotype analysis of all members of a family may be useful in the identification of those potentially susceptible to familial polyposis coli.

4158 INDICATIONS FOR AND VALUE OF RADIOLOGIC EXAMINATION OF THE COLON. A STUDY OF EFFICACY. (Dan.) Reichardt, J.; Sparso, B. H.; Hegedus, V. (Glostrup Hosp., DK-2600 Glostrup, Denmark). *Ugeskr. Laeger* 138(42):2557-2561; 1976.

4159 RADIOGRAPHIC INVESTIGATION OF THE COLON FOLLOWING ORAL ADMINISTRATION OF BARIUM SULPHATE WITHOUT PRIOR EVACUATION. (Dan.) Conrad, C.; Suhr-Jessen, O. (Parcelvej 156, DK-2830 Virum, Denmark). *Ugeskr. Laeger* 138(42):2564-2567; 1976.

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4175 BAUHIN'S VALVE UNDER NORMAL AND PATHOLOGICAL CONDITIONS. (Rus.) Shniger, N. U.; Ginzburg, S. N. (No affiliation given). *Vestn. Rentgenol. Radiol.* (6):52-57; 1976.

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4183 STUDY OF THE CIRCULATING IMMUNE COMPLEXES IN 59 CASES OF CROHN'S DISEASE. EFFECT OF MEDICAL AND SURGICAL TREATMENT. (Fre.) Fiasse, R.; Lurhuma, A. Z.; Cambiaso, C. L.; Masson, P. L.; Dive, C. (Service de Gastroenterologie et Laboratoire de Medicine Experimentale, Universite de Louvain, avenue Hippocrate 10, B-1200 Bruxelles, Belgium). *Biol. Gastroenterol. (Paris)* 9:315; 1976.

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4192 MACROSCOPIC AND MICROSCOPIC CHANGES IN THE HEMORRHOIDAL VASCULAR SYSTEM IN ASSOCIATION WITH HEMORRHOIDAL DISEASE. (Fre.) Davy, A.; Duval, C. (Hopital Charles-Nicolle, C.H.U. de Rouen, F 76000 Rouen, France). *Arch. Fr. Mal. App. Dig.* 65(7):515-521; 1976.

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4195 CLINICAL AND ROENTGEN FEATURES OF THE INTESTINAL POLYPOSIS SYNDROMES. (Eng.) Dodds, W. J. (Milwaukee County Medical Complex, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Gastrointest. Radiol.* 1(2):127-142; 1976.

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4197 DEGENERATED RECTAL AND COLONIC POLYPS ASSOCIATED WITH INFILTRATING CARCINOMA. (Fre.) Segol, P.; Verwaerde, J. C.; Davy, A.; Borel, B.; Gignoux, M. (C.H.U. Cote de Nacre, 14033 Caen Cedex, France). *Ann. Chir.* 31(10):805-809; 1976.

4198 FAMILIAL POLYPOSIS COLI AND PERIAMPULLARY CARCINOMA. (Eng.) Qizilbash, A. H. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario L8V 1C3, Canada). *Can. J. Surg.* 19(2):166-168; 1976.

See also, 3690, 3765, 3891, 3933, 3934, 4004, 4005, 4006, 4007, 4008, 4028, 4038, 4110, 4115, 4119, 4123, 4124, 4199, 4204, 4223, 4258, 4401, 4410, 4417, 4444, 4452.

LARGE INTESTINE

Ulcerative Colitis

4199 TRYPTIC ENZYMES IN THE DIFFERENTIAL DIAGNOSIS OF INFLAMMATORY DISEASES OF THE COLON. (Ger.) May, H.; Gries, G. (Diakonissenanstalt, Hessstrasse 22, D-8000 Munich 40, W. Germany). *Munch. Med. Wochenschr.* 119(5):155-158; 1977.

Inflammatory diseases of the colon in 523 patients were differentiated by measuring the fecal excretion of chymotrypsin A (CA). The diseases included ulcerative colitis (137 patients), proctosigmoiditis (252), Crohn's disease (6), and diverse diseases of the gastrointestinal tract (128). Patients with ulcerative colitis excreted significantly more CA than patients with proctosigmoiditis. The mean CA concentration excreted by ulcerative colitis patients was about 800 µg/g of stool compared with 200 µg/g for proctosigmoiditis patients. CA excretion exceeded 500 µg/g in 6 patients with Crohn's disease, whereas 128 patients with gastrointestinal diseases had a mean CA excretion of 180 µg/g. The results indicate that inflammatory diseases of the colon can be differentiated by means of the chymotrypsin A excretion in the stool.

4200 PREGNANCY IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Ger.) Morl, M.; Rottler, H.; Hartwich, G. (Stoffwechselklinik der Landesversicherungsanstalt Wurttemberg, Bismarckstr. 31, 6990 Bad Mergentheim, W. Germany). *Dtsch. Med. Wochenschr.* 102(11):387-391; 1977.

The course of 20 pregnancies in 15 women with ulcerative colitis (UC) and 4 pregnancies in 15 comparable women with Crohn's disease (CD) over a 6-yr period is described. Two pregnancies in the UC patients were not evaluated due to lack of data. The disease did not affect the fertility rate of UC patients: 15 conceptions occurred during the inactive stage or remission of UC and 7 during acute attacks or chronic courses. Of the 20 UC pregnancies, normal deliveries occurred in 14, spontaneous abortions in 4, and therapeutic abortions were performed in 2 patients. The four spontaneous abortions occurred in patients with disease of the entire colon, and three of four had conceived during the acute stage. A normal pregnancy without complications occurred in 12/14 who conceived while the disease was latent or in remission. Therapeutic abortions should be considered when the disease and pregnancy begin simultaneously. Pregnancy did not change the symptomatology in 14/20 patients; the condition became worse in 6 and improved in 2 patients postpartum. No malformations were noted in the infants. Of the 15 women with CD who did not take contraceptive pills (12 with ileocolitis and 3 with terminal ileitis), 4 became pregnant (1/3 with terminal ileitis and 3/14 with ileocolitis). Fertility seems to be significantly reduced in CD patients with ileocolitis ($p<0.0005$) but not in those with terminal ileitis. A normal pregnancy can be expected after conception in the inactive period (2/4), whereas premature birth occurred in two women who conceived during the active phase of CD.

4201 CYTOMEGALOVIRUS INCLUSIONS IN PATIENTS WITH ULCERATIVE COLITIS AND TOXIC DILATION REQUIRING COLONIC RESECTION. (Eng.) Cooper, H. S.; Raffensperger, E. C.; Jonas, L.; Fitts, W. T., Jr. (Jefferson Medical Coll. Hosp., 11th and Walnut St., Philadelphia, PA 19107). *Gastroenterology* 72(6):1253-1256; 1977.

Six ulcerative colitis patients were studied whose colons contained intranuclear inclusions characteristic for cytomegalovirus (CMV). These cases were found during microscopic examination of 50 colon resection specimens from 46 patients with ulcerative colitis. All six patients were men, 47 yr of age or older, and all had marked severe and fulminating courses. Five patients had toxic dilation of the colon. Three patients had received no steroid therapy before their toxic dilation; however, all received steroids during attempts at medical management. Two other patients were found to have toxic dilation of the colon among the 46 patients, however, no evidence of CMV was found in these 2 cases. There were six patients without toxic dilation whose colon specimens showed destructive inflammation and granulation tissue extending into the muscularis propria or transmurally. None of the colons from these patients contained CMV inclusions. The finding of CMV may be coincidental in ulcerative colitis, but CMV may have played a role in altering the clinical course of the six patients in this study.

4202 THE LEUCOCYTE CHEMOTACTIC FUNCTION IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Binder, V.; Riis, P. (Herlev Hosp., Univ. Copenhagen, DK 2730 Herlev, Denmark). *Scand. J. Gastroenterol.* 12(2):141-144; 1977.

The ability of neutrophilic granulocytes to react to a chemotactic stimulus was studied in 59 patients with ulcerative colitis in different stages of activity. Forty-one patients had active colitis, and the remaining patients had inactive disease (i.e., asymptomatic with a normal mucosa). Thirty-seven patients were untreated, while 21 received salazosulphapyridine (2-4 g daily), and 1 received prednisone enemas. The chemotactic response to casein of the WBC of the patients and of 25 controls was quantitated. WBC from the patients with ulcerative colitis showed a significantly lower chemotactic response index than WBC of normal controls (30.50 versus 15.15), and the index was lower in patients with active ulcerative colitis than in patients with inactive colitis (12.42 versus 21.37). There was no correlation between treatment and the chemotactic response.

4203 LYSOZYME IN PLASMA AND NEUTROPHILIC GRANULOCYTES IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Koldkjaer, O.; Klitgaard, N. A.; Schmidt, G. (Dept. Gastroenterology, Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12(2):135-140; 1977.

The lysozyme concentration in plasma (P) and in neutrophil WBC (N) was determined turbidimetrically in 32 patients with ulcerative colitis, 11 patients with Crohn's disease, 9 with hemorrhagic proctitis, and in 39 healthy controls. In the patients with ulcerative colitis, P increased 37% but N was reduced 30%. In patients with Crohn's disease and hemorrhagic proctitis, P and N were near normal. The high P in patients with ulcerative colitis reflects an accelerated destruction of neutrophil WBC as well as an increased turnover rate. The lowered N values may be due to inhibition of synthesis. The results suggest that lysozyme determination (N/P ratio) can be used in the differential diagnosis of active ulcerative colitis and Crohn's disease.

4204 TREATMENT OF HAEMORRHOIDS IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Jeffery, P. J.; Ritchie, J. K.; Parks, A. G. (St. Mark's Hosp., London, England). *Gut* 18(5): A424; 1977.

4205 THERAPY OF ULCERATIVE COLITIS IN CHILDHOOD. (Ger.) Ijaiya, K.; Dick, W.; Heimann, G. (Universitats-Kinderklinik Koln, Joseph-Stelzmann-Str. 9, 5000 Koln 41, W. Germany). *Therapiewoche* 26(34):5176-5179; 1976.

4206 PATHOGENESIS AND MEDICAL TREATMENT OF HEMORRHAGIC RECTOCOLITIS. (Fre.) Frexinos, J. (Hopital de Rangueil, F 31052 Toulouse Cedex, France). *Nouv. Presse Med.* 5(30):1901-1905; 1976.

4207 MODERN PRINCIPLES OF ULCERATIVE COLITIS TREATMENT. (Rus.) Makarevich, Ya. A.; Proshina, P. P. (Clinic Therapy, Astrakhan' Medical Inst., Astrakhan', USSR). *Klin. Med. (Mosk.)* 54(10): 97-102; 1976.

4208 HEMATO-TISSUE EOSINOPHILIA IN A CASE OF ULCEROUS RECTOCOLITIS. (Ita.) Molinari, F.; Carli, C.; De Benedetti, F.; Morchio, P. G. (Via Martiri della Liberta n. 12 A/7, 16156 Genova, Pegli, Italy). *Minerva Med.* 67(35):2289-2293; 1976.

4209 A PECULIAR ALKALINE PHOSPHATASE ISOENZYME IN PATIENTS WITH ULCERATIVE COLITIS. (Jpn.) Miki, K.; Suzuki, H.; Iino, S.; Niwa, H.; Oda, T.; Sugiura, M.; *et al.* (First Dept. Internal Medicine, Univ. Tokyo, Tokyo, Japan). *Jpn. J. Gastroenterol.* 73(2):162-168; 1976.

4210 ANTILYMPHOCYTE ANTIBODIES (ALA) IN INFLAMMATORY BOWEL DISEASE (IBD): EVIDENCE FOR A TRANSMISSIBLE AGENT [Abstract]? (Eng.) Miller, C. W.; Volpicelli, N. A.; Williams, R. C., Jr.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Clin. Res.* 25(2):111A; 1977.

4211 NUCLEIC ACID ANTIBODIES IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE (IBD) AND THEIR SPOUSES [Abstract]. (Eng.) DeHoratius, R. J.; Miller, C. W.; Volpicelli, N. A.; Williams, R. C., Jr.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Clin. Res.* 25(2):155A; 1977.

See also, 4097, 4468, 4469, 4477, 4479.

PANCREAS

4212 RATIONAL SEQUENCE OF TESTS FOR PANCREATIC FUNCTION. (Eng.) Mitchell, C. J.; Elias, E.; Agnew, J. E.; Summerfield, J.; Dick, R. (The Royal Free Hosp., London NW3 2QG, England). *Br. Med. J.* 2(6047):1307-1309; 1976.

^{75}Se-selenomethionine scanning and endoscopic retrograde pancreatography (ERP) were evaluated in relation to other pancreatic function tests to determine the most efficient combination of, or sequence of, tests for the routine clinical diagnosis of pancreatic disease. Of 144 patients with suspected pancreatic disease in whom a ^{75}Se-selenomethionine scan was performed, ERP was successful in 108 (75%). The final diagnosis was known in 100 patients. A normal scan reliably indicated a normal pancreas, but the scan was false-positive in 30%. ERP distinguished between carcinoma and chronic pancreatitis in 84% of cases but was false-positive in five patients with pancreatic disease. In extrahepatic biliary disease, both tests tended to give false-positive results. A sequence of tests to provide a rapid and reliable assessment of pancreatic function should be a radioisotope scan, followed by ERP (if the results of the scan are abnormal), and a Lundh test if the scan is abnormal but the findings on ERP are normal.

4213 FUNCTIONING CARCINOMA OF THE EXOCRINE PANCREAS, CASE REPORT AND REVIEW OF THE LITERATURE. (Ger.) Schreiber, D.; Probst, H. J. (Bezirkskrankenhauses, DDR-4021 Halle-Dolau, Rontgenstrasse, E. Germany). *Zentralbl. Allg. Pathol.* 121 (1/2):114-121; 1977.

A rare case of a functioning carcinoma of the exocrine pancreas with liver metastases and subcutaneous fat necrosis in a 62-yr-old man is presented. Initially, the patient presented with hepatomegaly, dyspnea, cyanosis of the lips, swollen knee joints, edema of the lower limbs, and reddish-blue spots on the skin of the legs. X-ray of the abdomen showed a caudally displaced colon. The patient's condition deteriorated, and he died of circulatory failure with a clinical diagnosis of an undefined tumor of the epigastrium. Autopsy revealed a widespread greyish-white to greyish-red, necrotic tumor occupying almost all the pancreas. Marked ectasia with ventral and caudal displacement of the stomach and transverse colon were noted. In the liver, there were chestnut-sized metastases with fatty areas of the parenchyma. Marked splenomegaly with moderate chronic nonspecific epicarditis and general arteriosclerosis were apparent. Microscopy of the pancreatic tumor showed that the tumor cells were mostly cylindrical with eosinophilic cytoplasm. The skin showed marked panniculitis but no positive proof of tumor cells.

4214 HEPATIC MANIFESTATION OF MUCOVISCIDOSIS. (Ger.) Luftner, J.; Scheibner, K.; Wockel, W. (Institut Allgemeine Pathologie der Medizinischen Akademie, DDR-50 Erfurt, Nordhauser Strasse 74, E. Germany). *Zentralbl. Allg. Pathol.* 121(1/2):195-200; 1977.

Hepatic manifestations were found at autopsy in 3/25 children who died of mucoviscidosis. Pulmonary manifestations were the cause of death in 24 children and 1 child died of meconium peritonitis. Focal biliary fibrosis was noted in a 3-month-old boy and an 8-month-old girl. An enlarged yellow liver with a slight irregular or scarred surface was seen in both cases. Microscopy revealed markedly enlarged Glisson's capsules with rich collagenous connective tissue and newly formed bile ducts with a very wide lumen and PAS-positive material. Swollen hepatocytes and isolated liver cell necrosis were also seen, but no cholestasis or inflammatory changes. Multilobular biliary cirrhosis was detected in a 7.5-yr-old boy who had an enlarged yellow liver with widely scarred surface. Histological examination showed irregular fibrotic areas with unclear demarcations diffusely permeated by pseudobiliary ducts. Secondary rather than primary alterations of the liver are far more frequent in mucoviscidosis.

4215 CURRENT STATUS OF REGIONAL PANCREATECTOMY (EN BLOC PANCREATIC, PORTAL VEIN AND LYMPH NODE RESECTION) [Abstract]. (Eng.) Fortner, J. G.; Kim, D. K.; Cubilla, A. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72 (5, Part 2):1159; 1977.

4216 A CONTROLLED EVALUATION OF HIGH DOSE RADIATION AND COMBINED RADIATION AND 5-FLUOROURACIL (5-FU) THERAPY FOR LOCALLY UNRESECTABLE PANCREATIC CARCINOMA [Abstract]. (Eng.) Anonymous. (Gastrointestinal Tumor Study Group, Miami, FL). *Gastroenterology* 72(5, Part 2):1077; 1977.

4217 WATERY DIARRHEA SYNDROME WITH ELEVATED LEVELS OF VASOACTIVE INTESTINAL POLYPEPTIDE ASSOCIATED WITH PANCREATITIS AND PANCREATIC PSEUDOCYST [Abstract]. (Eng.) Burbige, E. J.; Manning, R. J.; Belber, J. P. (Veterans Admin. Hosp., Martinez, CA). *Gastroenterology* 72(5, Part 2):1155; 1977.

4218 CONGENITAL PANCREATIC HYPOPLASIA (SHWACHMAN'S SYNDROME) [Abstract]. (Eng.) Aggett, P. J. A.; McCollum, J. P. K.; Sutcliffe, J.; Harries, J. T. (Inst. Child Health, Great Ormond St., London, England). *Gut* 18(5):A414; 1977.

See also, 3730, 3746, 3747, 3938, 3939, 3947, 3975, 3976, 3978, 3979, 3980, 3983, 4009, 4016, 4018, 4096, 4198, 4232, 4238, 4270, 4391.

PANCREAS

Pancreatitis

4219 PANCREATIC ASCITES: REPORT OF 14 CASES. (Fre.) Gouerou, H.; Cerf, M.; Benhamou, G.; Leymarios, J.; Debray, C. (Chaire de Clinique des maladies de l'Appareil digestif, Service de Gastro-Enterologie A, Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 65(6):433-442; 1976.

Of 400 cases of chronic or subacute pancreatitis, long-lasting pancreatic ascites with high amylase levels was found in 14 patients. Pancreatic ascites are a serious complication because of associated weight loss, severe hypoalbuminemia, and other manifestations such as pleural and pericardial effusions, peripheral s.c. cytosteatonecrosis, and thromboembolism. The ascitic fluid always showed high protein levels, and peritoneal amylase levels always exceeded plasma amylase levels. A poor prognosis is reflected by the high mortality rate: two of nine patients died after surgery (3 relapses in 1 case), and three of five patients died without undergoing surgery. The causative lesions were mainly pancreatic cysts or segmental necrosis, some of which communicated with the peritoneal cavity. Portal hypertension or lymphatic blockade did not appear to be a determining factor. Surgery, rather than conservative therapy, is indicated whenever pancreatic ascites supervenes during the course of chronic pancreatitis.

4220 ULTRASONIC FEATURES OF ACUTE PANCREATITIS. STUDY OF 49 PATIENTS EXAMINED IN REAL TIME AND WITH GREY SCALE. (Fre.) Weill, F.; Bourgoin, A.; Eisenscher, A.; Gillet, M. (Service de Radiologie Centrale, Departement de Diagnostic, C.H.U., 2, place Saint-Jacques, F 25000 Besancon, France). *Arch. Fr. Mal. App. Dig.* 65(6):443-454; 1976.

Forty-nine patients suffering from acute pancreatitis (43 primary cases and 6 with chronic pancreatitis) were examined by echotomography in association with real time, the classic technique of "all or nothing," and with the grey scale technique. In two patients, the ultrasonic pictures revealed highly reflectogenic echostructure (type I). The echostructure was of a transonic pseudo-liquid type in 9 patients (type II), nonhomogeneous in 29 (type III), and nonhomogeneous with liquid areas in 4 (type IV). Rapid regression of these features was not unusual, particularly for types II and III. In the six cases of acute pancreatitis complicating chronic pancreatitis, the findings were less characteristic. The authors conclude that tomography during episodes of acute abdominal pain can provide highly specific images unavailable by other conventional radiologic techniques.

4221 CAROLI'S DISEASE WITH ACUTE PANCREATITIS AND ANGIOCOLITIS: DIAGNOSTIC AND THERAPEUTIC VALUE OF BILIARY DUCT ENDOSCOPY. (Fre.) Sahel, J.; Bourry, J.; Sarles, H. (Hopital Ste Marguerite, 270, Sainte Marguerite, F 13274 Marseille Cedex 2, France). *Nouv. Presse Med.* 5(32):2067-2069; 1976.

The use of retrograde endoscopic catheterization of the bile ducts was evaluated in a 65-yr-old woman with Caroli's disease associated with acute pancreatitis and angiocolitis. Initially the patient presented with intense epigastric pain and vomiting. Radiography with i.v. contrast media showed exclusion of bile ducts, and a gastroduodenal transit study indicated a diverticulum of the second segment of the duodenum. Moderate dilation of the extrahepatic bile ducts particularly of the intrahepatic branches with numerous cystic distentions was confirmed by endoscopic choledochowirsungography. During the examination, gentamycin (1 mg/ml) was mixed with the contrast medium. At follow-up, the patient was in excellent condition and the 10-day-old fever had abated. At a 16-month follow-up, no painful or angiocolitic symptoms were noted.

4222 ENTEROVIRUS INFECTIONS IN ACUTE PANCREATITIS--A POSSIBLE ETIOLOGICAL CONNECTION. (Eng.) Arnesjo, B.; Eden, T.; Ihse, I.; Nordenfelt, E.; Ursing, B. (Dept. Bacteriology, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 11(7):645-649; 1976.

A prospective study of 91 patients with confirmed acute pancreatitis screened from 142 patients seen over a 1-yr period with a preliminary diagnosis of this disease is presented. Several etiological factors of possible importance were tabulated: cholelithiasis (49 patients), alcohol (14 patients), trauma (5 patients), enterovirus (8 patients), mycoplasma (1 patient); 11 cases were classed as idiopathic, and in 3 cases, the etiological factors were not looked for. In the eight cases in which viral etiology was identified, the criteria used were isolation of enterovirus from the patients and evidence of significant titer rise against the viral type isolated. The viral agents identified were Coxsackie viruses B2, B3, and B5 and ECHO viruses 6, 11, 22, and 30. In 10 other patients, evidence of enterovirus infection was found, but there was no titer rise of neutralizing antibodies. The rate of isolation of enteroviruses in the population having acute pancreatitis was 18 of 91, as compared with the rate among a general population screened at the same period, which was 3% of 984.

4223 COLON STENOSIS AFTER PANCREATITIS. (Ger.) Lankisch, P. G.; Lopez, E.; Winckler, K.; Schuster, R. (Medizinische Universitatsklinik, Humboldtallee 1, D-3400 Gottingen, W. Germany). *Schweiz. Med. Wochenschr.* 106(37):1243-1247; 1976.

Barium enema revealed partial colonic stenosis at the splenic flexure in 5/35 patients with acute (2), acute relapsing (1), or chronic pancreatitis (2). A subsequent laparotomy in three of five patients showed colonic perforation with retroperitoneal abscess, adhesions between the colon and pancreas, and marked pancreatic edema, resp. These patients complained of bloody stools. A barium enema follow-up 3 and 6 months later revealed spontaneous resolution of the stenosis in two patients. A review of the literature showed that in 35 other cases, colonic stenosis after pancreatitis was usually incomplete, located at the splenic flexure, and due to adhesions between the colon and pancreas. Of these 35 patients, 2 underwent conservative therapy and 31 underwent laparotomy; resection of the pancreas and colon was performed in 18/31. Two other patients died during surgery. Evaluation of the total 40 cases suggests that the extent and development of partial or complete colonic stenosis after pancreatitis are independent of the age of the patient or the etiology and severity of the pancreatitis.

4224 SERUM ISOAMYLASES IN CHRONIC PANCREATITIS. (Eng.) Skude, G.; Eriksson, S. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 11(5):525-527; 1976.

Serum isoamylases were quantitated separately in 15 patients with chronic pancreatitis as an index to pancreatic exocrine function. The isoamylases were separated and measured by agarose electrophoresis. In 156 healthy controls, the range of variation of pancreatic isoamylase activity was 45-175 U/l (mean=88 U/l). All 15 patients with chronic pancreatitis had values lower than 2 standard deviations below the normal mean. The complete absence of pancreatic isoamylase was noted in eight patients, resulting in a mean value of 7 U/l for all the patients. The mean salivary isoamylase activity was 82 U/l in the normal controls and 124 U/l in the patients ($p<0.01$). Determination of the serum pancreatic isoamylase is a simple screening procedure that should be useful in the diagnosis of exocrine pancreatic insufficiency.

4225 COMPARATIVE ASSESSMENT OF DIAGNOSTIC TESTS IN PANCREONECROSIS. (Rus.) Vladimirov, V. G.; Sergienko, V. I.; Farkhutdinov, R. R.; Zhuravlev, A. G. (Dept. Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 54(10):85-90; 1976.

4226 AMYLASE CLEARANCE IN RELATION TO CREATININE CLEARANCE IN THE DIAGNOSIS OF ACUTE PANCREATITIS. (Fre.) Hostein, J.; Fournet, J.; Morel, F.; Denis, M. C.; Bonnet-Eymard, J. (Centre Hospitalier Regional et Universitaire, F 38043 Grenoble Cedex, France). *Nouv. Presse Med.* 5(31):1979-1980; 1976.

4227 ACUTE PANCREATITIS--FOLLOW-UP 5-14 YEARS [Abstract]. (Eng.) Madsen, O. G.; Schmidt, A. (Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 41):86; 1976.

4228 TREATMENT OF ACUTE PANCREATITIS WITH PROTEINASE INHIBITORS. (Rus.) Seferovsky, L. E.; Lipnitsky, E. M. (Second Dept. Surgery, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (10):109-113; 1976.

4229 CORTICOTHERAPY AND PANCREATITIS. (Fre.) Bourry, J.; Sarles, H. (INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol.* 9:327-328; 1976.

4230 DRUGS AS ASSOCIATED FACTORS IN PRIMARY ACUTE PANCREATITIS [Abstract]. (Eng.) Bourke, J. B.; McIlmurray, M. B.; Mead, G. M.; Langman, M. J. S. (City and General Hosp., Nottingham, England). *Gut* 18(5):A422-A423; 1977.

4231 PULMONARY INTERSTITIAL ALBUMIN IN EXPERIMENTAL ACUTE HEMORRHAGIC PANCREATITIS [Abstract]. (Eng.) Heinle, F.; Webster, M. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA). *Clin. Res.* 25(3):312A; 1977.

4232 SOME HUMORAL AND CELLULAR INDICES IN DIFFERENT FORMS OF PANCREATITIS. (Rus.) Velbri, S.; Frimel, Kh.; Tsastrov, R. (Central Medical Scientific Res. Lab., Tartu Univ., Tartu, USSR). *Ter. Arkh.* 48(10):112-116; 1976.

4233 HORMONAL MECHANISMS IN THE HYPOCALCEMIA OF PANCREATITIS [Abstract]. (Eng.) Knecht, G. L.; Wheeler, H. O.; Deftos, L. J. (Dept. Medicine, Univ. California, La Jolla, CA). *Gastroenterology* 72(5, Part 2):1081; 1977.

4234 COMPARISON OF CAERULEIN AND CHOLECYSTOKININ EFFECTS UPON ENZYME CONCENTRATIONS IN DUODENAL ASPIRATES. (Eng.) Minaire, Y.; Descos, L. (Hopital Edouard-Herriot, F-69374 Lyon Cedex 2, France). *Digestion* 15(1):86-89; 1977.

4235 VASCULAR PERMEABILITY INDUCED BY PANCREATIC EXUDATE FORMED DURING ACUTE PANCREATITIS IN DOGS. (Eng.) Takada, Y.; Appert, H. E.; Howard, J. M. (Medical Coll. Ohio at Toledo, Toledo, OH). *Surg. Gynecol. Obstet.* 143(5):779-783; 1976.

4236 EXTRAPERITONEAL COMPLICATIONS OF ACUTE PANCREATITIS. (Dut.) De Cock, G. (Akademisch Ziekenhuis, Dienst Inwendige Ziekten, Afdeling Gastroenterologie, De Pintelaan 135, B-9000 Gent, Belgium). *Tijdschr. Gastroenterol.* 19(3):170-183; 1976.

4237 NECROSIS IN ACUTE PANCREATITIS: COMPARISON OF OPERATIVE AND PATHOLOGICAL FINDINGS IN SEVEN CASES. (Fre.) Leger, L.; Chiche, B.; Louvel, A. (Hopital Cochin, 27, Rue du Fg Saint-Jacques, F 75674 Paris Cedex 14, France). *Nouv. Presse Med.* 6(5):337-340; 1977.

4238 DISSECATIO PROFUNDA VENTRICULI AS AN UNCOMMON COMPLICATION OF NECROTIZING PANCREATITIS. (Ger.) Putzke, H. P.; Brockmoller, S. (Institut fur Allgemeine und Spezielle Pathologie der Wilhelm-Pieck-Universitat Rostock, Bereich Medizin, DDR-25 Rostock 1, Strempelstrasse 14, E. Germany). *Zentralbl. Allg. Pathol.* 120(6):478-480; 1976.

4239 BLOCKING OF PANCREATIC EXOCRINE FUNCTION IN THE TREATMENT OF CHRONIC PANCREATITIS. (Ger.) Hoffmann, E.; Usmiani, J.; Gebhardt, C. (Chirurgische Abteilung, Krankenhaus St. Josef, 5600 Wuppertal-Elberfeld, Bergstr. 6-12, W. Germany). *Dtsch. Med. Wochenschr.* 102(11):392-395; 1977.

4240 HYDROCHLORIC ACID-INDUCED SECRETIN RELEASE, AND HALF-LIFE OF EXOGENOUS SECRETIN IN PATIENTS WITH CHRONIC PANCREATITIS [Abstract]. (Eng.) Pelletier, M. J.; Chayvialle, J. A.; Descos, L.; Kiriacos, J.; Lambert, R. (Hopital E-Herriot, 69374 Lyon, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):14; 1976.

4241 CONTENT OF HISTAMIN AND SEROTONIN IN THE BLOOD OF PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Orlov, V. A.; Meshcheraykova, S. A.; Razu, A. A. (Dept. Therapy for Residents, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 54(10):91-94; 1976.

4242 THERAPY OF PEPTIC ULCER AND OF CHRONIC RELAPSING PANCREATITIS. (Ger.) Ruppin, H. (Medizinische Universitatsklinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95 (5):305-309; 1977.

4243 A METABOLIC HYPOTHESIS FOR ALCOHOLIC PANCREATITIS [Abstract]. (Eng.) Dreiling, D. A.; Bordalo, O. (Mount Sinai Sch. Medicine, New York, NY 10029). *Fed. Proc.* 36(3):594; 1977.

4244 HYPOTENSIVE MANAGEMENT OF PSEUDOANEURYSMS OF THE MESENTERIC VESSELS IN ASSOCIATION WITH ACUTE ALCOHOLIC PANCREATITIS [Abstract]. (Eng.) Trenbeath, J. M.; Butt, J.; Mullins, M. (Harry S. Truman Memorial Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(1):19A; 1977.

See also, 3732, 3733, 3736, 3902, 3937, 3939, 3947
3950, 3975, 3977, 3981, 3982, 4017, 4367.

LIVER AND BILIARY TRACT

4245 EXAMINATION OF HEPATOBILIARY FUNCTION USING A SCINTILLATION CAMERA AND ELECTRONIC DATA PROCESSING. (Ger.) Kuba, J.; Ullmann, V.; Kuchar, O.; Vavros, B.; Sajnar, J. (Nuklearmedizinische Abteilung des Bezirkskrankenhauses, Strasse Vitezneho unora 1790, 708 52 Ostrava, Czechoslovakia). *Nuklearmedizin* 15(2):63-70; 1976.

After i.v. administration of ^{131}I-BSP, hepatobiliary function was evaluated in 20 controls and in 70 patients with a suspicion of hepatobiliary disease by sequential scintigraphy (SS) using a scintillation camera. To verify the results, a liver biopsy was done in 49 patients with compensated and decompensated cirrhosis plus hyperbilirubinemia, chronic aggressive hepatitis, and total obstruction of the biliary tract. In the controls, radioactivity was detected after 20-30 min in the subhepatic region and after 40 min in the entire gallbladder; the transverse colon was visible after 24 hr. In patients with carcinoma of the head of the pancreas and obstructive jaundice, there was no passage of radioactivity into the intestines. Conversely, activity was detected after 3 or 24 hr in icteric patients with liver cirrhosis. The velocity coefficients obtained by computer ranged from 0.19 to 0.31 for the controls and from 0.06 to 0.19 for the patients. A liver abscess was detected in one patient, and malignant transformation was detected in seven. Comparison with the standard BSP test demonstrated SS to be more sensitive.

4246 MARKED DELAY IN INDOCYANINE GREEN PLASMA CLEARANCE WITH A NEAR-NORMAL BROMOSULPHOPHTHALEIN RETENTION TEST: A CONSTITUTIONAL ABNORMALITY? (Eng.) Okuda, K.; Ohkubo, H.; Musha, H.; Kotoda, K.; Abe, H.; Tanikawa, K. (First Dept. Medicine, Chiba Univ. Sch. Medicine, Chiba, Japan). *Gut* 17(8):588-594; 1976.

The cases of five patients showing a normal BSP and a marked delay in indocyanine green (ICG) plasma clearance and two patients' families with clustering of the same abnormality are described. Two patients had Gilbert's syndrome (patient 1 and 2), one (patient 4) had an acute hepatitis B surface antigen (HBsAg)-negative hepatitis, and the other two (patient 3, cervical lymphadenitis; patient 5, prostate carcinoma) had no detectable liver abnormality. Plasma disappearance curves for ICG declined linearly after i.v. administration of 0.5 mg/kg ICG or 5 mg/kg BSP under fasting conditions. Retention of BSP at 45 min was 4.9%, and retention of ICG at 15 min was 67.3% (case I). Marked reduction in hepatic uptake, storage capacity, and biliary transport maximum was reported in patients 1, 2, and 3. Patients and controls showed similar ICG distribution and amount bound per unit protein. No consanguinity was demonstrated in the two families and pedigrees (patients 4 and 5) studied. Incidence of disparity between marked ICG retention and normal BSP test is very high among patients with Gilbert's syndrome (2 of 8), compared to controls (3 of 1,000). No selective BSP abnormality in the face of normal ICG test was reported in 200 patients. A preliminary defect in the transport of ICG by hepatocytes is suggested.

4247 CHARACTERISTIC ALTERATIONS OF SERUM ISOENZYMES OF AMYLASE IN DISEASES OF LIVER, PANCREAS, SALIVARY GLAND, LUNG, AND GENITALIA. (Eng.) Warshaw, A. L.; Kang-Hyun, L. (Harvard Medical Sch., Boston, MA 02114). *J. Surg. Res.* 22(4):362-369; 1977.

Serum amylases were analyzed by electrophoresis and isoelectric focusing in sera from 30 normal subjects and 61 patients with diseases associated with hyperamylasemia (common bile duct obstruction without pancreatitis, 20; pancreatic carcinoma, 5; salivary gland trauma, 5; acute and chronic liver disease, 14; macroamylasemia, 5; and various other disorders, 12). Electrophoresis of normal serum revealed two major peaks of amylase activity; one corresponding to pancreatic (P1) and one to salivary (S1) isoamylases. Two to four minor peaks were also present in normal serum, and a slower-moving amylase, found to increase in liver disease, was detected in small quantities in sera from 20% of normal subjects. Isofocusing of normal serum showed four definite peaks of amylase activity.

Serum from patients demonstrated all the electrophoretic peaks of amylase activity observed in normal serum; however, one or more peaks may be elevated and new peaks may appear. Electrophoretic patterns for various diseases are described. Similarly isoelectric focusing of serum from patients with hyperamylasemia revealed characteristic patterns permitting identification of the source of the amylase isoenzymes. Analysis of serum by electrophoretic and isoelectric technique is clinically useful when the cause of hyperamylasemia is uncertain.

4248 THE PEROXISOMES OF HUMAN HEPATOCYTES. (Eng.) Sternlieb, I.; Quintina, N. (Div. Genetic Medicine, Dept. Medicine, Albert Einstein Coll. Medicine, Bronx, NY 10461). *Lab. Invest.* 36(2):140-149; 1977.

The peroxisomes of 16 patients with various liver diseases and 4 normal subjects were studied in electron micrographs of liver biopsy specimens. In most of the pathologic hepatocytes, peroxisomes exhibited an increase or decrease in size or numbers when compared to controls and/or alterations of the consistency of the matrix, abnormal clustering, and the appearance of electron-dense inclusions. Some of these abnormalities were reversible in three patients with Wilson's disease treated with D-penicillamine. Although no specific pattern of morphologic alterations of peroxisomes could be correlated with any particular disease, the abnormalities were consistent with a role of these organelles in lipid metabolism.

4249 AN INTERPRETATION OF THE SERUM ALKALINE PHOSPHATASE ISOENZYME PATTERNS IN PATIENTS WITH OBSTRUCTIVE LIVER DISEASE. (Eng.) Price, C. P.; Sammons, H. G. (Southampton General Hosp., Southampton, England). *J. Clin. Pathol.* 29(11):976-980; 1976.

To examine the theory that biliary obstruction leads to an increase of alkaline phosphatase isoenzymes in the circulation together with regurgitation of bile alkaline phosphatase isoenzyme, the isoenzyme patterns of 194 patients with proven hepatobiliary disease were studied. The patients included 37 with extrahepatic obstruction, 14 with hepatic metastatic carcinoma with jaundice, 42 with carcinoma without jaundice, 24 with viral hepatitis, and 77 with other hepatic disorders; 19 patients with skeletal disorders were also included. The serum alkaline phosphatase isoenzyme patterns were similar in all patients with liver disease. The isoenzyme with an electrophoretic mobility similar to that of the liver isoenzyme and the isoenzyme remaining at the origin represented the main fractions present. The "origin" isoenzyme bore so many similarities to the main isoenzyme in human bile that it was designated the bile isoenzyme. It was found in 98% of all the patients with liver disease. The results support the theory that in biliary obstruction the increase in serum alkaline phosphatase is in part due to regurgitation of the biliary isoenzymes.

4250 CLINICAL SIGNIFICANCE OF SERUM PHOSPHOLIPIDS IN SOME HEPATOBILIARY SYSTEM DISORDERS. (Rus.) Frolkis, A. V.; Kondrachenko, O. V.; Abramzon, M. A. (Dept. Internal Medicine, Univ. Petrozavodsk, Petrozavodsk, USSR). *Sov. Med.* (5):101-105; 1976.

The clinical significance of blood serum phospholipids was studied in 111 patients with chronic disorders of the hepatobiliary system (27, liver cirrhosis; 45, chronic hepatitis; 6, active phase of chronic hepatitis; 7, fatty degeneration of the liver; and 26, cholelithiasis). Seven basic phospholipid fractions--cardiolipin, cephalin, lecithin, sphingomyelin, phosphatidylserin, phosphatidylinosite and lysolecithin--were analyzed by bidimensional chromatography on silica gel. In patients with liver cirrhosis or the active phase of chronic hepatitis, total phospholipids were decreased to 201.5 ± 7.0 mg% compared to 303.4 ± 24.0 mg% in controls ($p<0.01$). In fatty degeneration, they increased to 381.9 ± 5.7 mg%. In cholelithiasis, they were essentially unchanged (340.3 ± 10.6 mg%, $p>0.5$). Phospholipids showed decreased lysolecithin ($p<0.01$) and sphingomyelin ($p<0.02$) levels with a relative rise in lecithin, phosphatidylserine, and phosphatidylinosite ($p<0.01$). In patients with chronic persistent hepatitis only phosphatidylserine and lysolecithin were changed essentially. In cholelithiasis, cephalin was decreased. In 17/27 patients with liver cirrhosis, in all active hepatitis patients, and in 12/45 chronic hepatitis patients, two additional ninhydrin-positive phospholipid fractions were encountered. Phospholipid fractions were investigated repeatedly in four patients with cirrhosis and in eight chronic hepatitis patients in clinical remission. In hepatitis, phospholipids, except for lysolecithin, tended to normalize. In cirrhosis, alterations of phospholipids were not seen, however, additional phospholipid fractions disappeared. Differences in the glutamic pyruvic transaminase activity were distinguished in cirrhosis and chronic hepatitis. These changes in the blood serum phospholipid fractions reflect pathological processes in the liver. The appearance of additional phospholipid fractions is considered a sign of aggravation of the liver disease.

4251 GAMMA-GLUTAMYL TRANSPEPTIDASE LEVELS IN DISEASES OF THE LIVER AND BILE DUCTS. (Hun.) Varga, L.; Sohar, I.; Dobronte, Z. (I. Belgyogyaszati Klinika, Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *Orv. Hetil.* 117(4):201-203; 1976.

Serum γ-glutamyl transpeptidase (GGT) levels were determined in 133 patients with various hepatic and biliary diseases and compared with other enzyme activities. Sera from 23 subjects with intact liver were used for control. The GGT levels (in U/l) were 286 ± 46 in patients with intrahepatic tumor metastases, 95 ± 17 in liver cirrhosis, 161 ± 51 in cholangiohepatitis, 301 ± 43 in hepatic bile duct obstruction, 80 ± 13 in alcoholic liver diseases (chronic alcoholic hepatitis and liver cirrhosis), and 18 ± 3 in nonalcoholic fatty liver degeneration; the control value was 16 ± 2. Consequently, the GGT levels were significantly higher than in the controls in all groups, except for patients with fatty liver. The alkaline phosphatase activity was similarly increased in patients with biliary tract obstruction, intrahepatic tumor metastases, and cholangiohepatitis. The lactate dehydrogenase was significantly increased in tumor patients only. The glutamic-pyruvic transaminase and glutamic-oxaloacetic transaminase levels were increased mainly in patients with liver cirrhosis and biliary tract obstruction. The findings indicate that the GGT test is a more sensitive diagnostic tool than any of the other enzymes investigated.

4252 ANTIBODY ACTIVITY IN SOME CHRONIC LIVER DISEASES. (Cze.) Macak, J. (Katedra patologie lekarske fakulty University Palackeho, 775 00 Olomouc, Jilova 25, Czechoslovakia). *Cas. Lek. Cesk.* 115(48):1483-1486; 1976.

Twenty patients with cholestasis, 27 with liver cirrhosis of other than biliary etiology, and 19 with chronic hepatitis and other chronic liver diseases were studied. To determine the occurrence of antimitochondrial, smooth muscle, and antinuclear antibodies (AMA, SMA and ANA, resp.), the Coons immunofluorescence technique, using fresh or freeze-thawed sera and human or rat organs, was used. In the first group, all eight cases of primary biliary cirrhosis gave positive results for AMA, while two of them gave positive SMA results. Of the five patients with extrahepatic cholestasis, AMA was present in two, and SMA in one. Two of these had secondary biliary cirrhosis. In the second group, AMA was present in eight patients, and SMA was present in four patients, most of them with cryptogenic liver cirrhosis (AMA in four, SMA in two) or postviral hepatitis liver cirrhosis (AMA in two). The presence of AMA and SMA in one Wilson's disease patient was unusual. All three patients with lupoid hepatitis had AMA, with responses varying, depending on the antigenic substrate. In the third group, AMA were detected in one case of chronic alcoholism with liver fibrosis and steatosis, one case of porphyria cutanea tarda, and one unclear case identified at autopsy as venulo-occlusive disease. Results indicate a definite difference between the AMA pictures in acute liver diseases and primary biliary cholestasis. These tests should be useful in the further clarification of autoimmune diseases.

4253 TREATMENT OF CHRONIC LIVER DISEASES. (Ger.) Moller, E.; Schmitt, R. (Evangelisches Krankenhaus, Innere Abteilung, D-6702 Bad Durkheim, W. Germany). *Med. Klin.* 71(43):1831-1835; 1976.

The results of treating 89 chronic liver disease patients with combined i.v. and p.o. thioctic acid (TA) are reported. The diseases included chronic hepatitis (42), hepatic cirrhosis (25), protracted hepatitis (14), and alcohol-toxic adiposis hepatica, stage II (8). The average age of the patients was 43.9 yr. Patients were started on TA (50 mg b.i.d. i.v.) while hospitalized (4-6 weeks) and then put on TA (two 50-mg tablets t.i.d.) for an average of 3 months on an outpatient basis. Responding patients showed a significant improvement in SGOT, SGPT, and α-glutamyltransferase, accompanied by histological improvement. Overall, liver function improved in 66 patients, remained unchanged in 12, and worsened in 11. A histological examination was performed in 44 patients: 36 patients showed improvement, 5 remained unchanged, and 3 worsened. Patients with posthepatic cirrhosis, chronic alcohol-toxic hepatitis, and alcohol-toxic adiposis hepatica had almost 100% histological improvement. One patient complained of difficulty in breathing, which was attributed to the fast injection rate of TA. No other side-effects were noted.

4254 THE DIAGNOSIS OF HEPATIC METASTASES BY ENZYME ESTIMATION. THE VALUE OF GAMMA-GLUTAMYLTRANSPEPTIDASE. (Fre.) Champault, G.; Garnier, M.; Patel, J. C. (35, rue Ampere, F 94400 Vitry-sur-Seine, France). *Nouv. Presse Med.* 6(19): 1635-1637; 1977.

Serum enzyme levels were determined in 50 patients (22 women, 28 men; average age, 65.2 yr) with various tumors, 25 of whom also had hepatic metastases (HMS). The tumor sites included colorectum (16 patients), stomach (10), pancreas (3), primary liver (2), esophagus (1), bladder (3), prostate (3), ovary (1), uterus (1), and breast (1). An additional six patients had liver metastases and undiagnosed primary site tumors. None of the patients had other hepatic, biliary, or pancreatic diseases. All the cancer patients with HMS had a marked elevation of gamma-glutamyltranspeptidase (GGT) with an average value of 287 IU for the 25 patients. Average values for the other enzymes were alkaline phosphatase (AP), 434 IU; SGOT, 58.8 IU; SGPT, 80.5 IU; and 5'-nucleotidase, 126 IU. The increase in GGT was correlated with the presence of HMS in 96% of the cases and was a better indicator of metastases than AP (84%), SGOT (72%), or SGPT (64%). Patients without HMS and controls showed no significant differences in levels of GGT, AP, SGOT, or SGPT. The results suggest that the measurement of GGT is an accurate diagnostic aid for HMS.

4255 MECHANISMS AND HISTOPATHOLOGICAL BASES OF THE DIFFERENT KINDS OF INTRAHEPATIC EXCRETORY CHOLESTASES. (Fre.) Albot, G.; Caulet, T.; Petit, J. (8, rue des Saints-Peres, 75007, Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 13(1):9-63; 1977.

Excretory cholestases may be due to lesions of the biliary pole of the hepatocyte or of the intra- or extrahepatic biliary tract, in contrast to secretory cholestases, which are caused by obstacles to bile secretion. The histological findings and causal mechanisms of biliary necrosis, centrolobular obstruction, dilatation of cholangioles, and pseudobile ducts are discussed. Biological consequences, such as bilirubinemia and hypercholalemia, and their pathogenicity are explored. The causes and histopathological bases of the acute excretory cholestases in viral hepatitis are surveyed along with jaundice during pregnancy and iatrogenic icterus caused by steroids or phenothiazin derivatives. Finally, the different chronic intrahepatic cholestases of Hanot's disease are described, and their particular etiopathology is discussed.

4256 NOTES ON PRURITUS WITH OR WITHOUT ICTERUS IN SEVEN CASES OF BENIGN RECURRENT INTRAHEPATIC CHOLESTASIS DURING PREGNANCY. (Ita.) David, D.; Garda, E.; Serra, E.; Sanesi, A. (Ospedale Maria Vittoria, Turin, Italy). *Minerva Gastroenterol.* 21(3):139-154; 1975.

Clinical data are reported in seven cases of benign recurrent intrahepatic cholestasis during pregnancy. All patients (27-36 yr old, in the 5th-8th month of pregnancy) manifested pruritus symptoms associated with cholestatic jaundice (5) or subicteric condition of the sclera (1); no jaundice was present in one patient. Glucuronates and nicotinamide, i.v., and cortisone induced decrease or disappearance of the pruritus symptoms, which recurred after treatment. Cholestyramine resin administered to one patient had a moderate antipruritic effect; there were no side-effects. Six of the patients had normal pregnancy and birth, while one gave premature birth (8th month) to a dead fetus (6 months old). The pathogenesis of the pruritus symptoms, with or without jaundice, may be attributed to the high hormone levels, rather than attributed to the high hormone levels, rather than to disturbances in the bilirubin uptake, or to diminution of the enzymatic activity required for bilirubin conjugation. The hormone overload may be responsible for alterations in the excretion mechanism of bilirubin. Since the hormone levels determined in these seven patients were discrepant and confusing (the pregnanediol was very high in one, same as in normal pregnancy in five, and lower than normal in one, while the estriol was normal in three and lower than normal in four), it is also suggested that the pathogenesis may be due to hormonal metabolites that are not usually present in pregnancy.

4257 PORTAL HYPERTENSION DUE TO CONGENITAL HEPATIC FIBROSIS. REPORT OF TEN CASES. (Por.) Okumura, M.; Shiroma, M.; Nakagawa, W. S.; do Canto, A. L.; Goncalves Borges, M. A.; Rosenbojn, J.; *et al.* (Depart. Clin. Medica, Fac. Medicina da Univ. de Sao Paulo, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 31(3):166-173; 1976.

Diagnosis of congenital hepatic fibrosis was established in 10 patients (aged 11-33 yr) who underwent portosystemic by-pass for portal hypertension. Clinical manifestations, splenoportography, blood biochemistry, and macroscopic liver examination were recorded, and diagnosis was confirmed in each case by histological examination of liver biopsy tissue. Histopathology showed extensive fibrous connective tissue strands radiating from portal spaces and terminating abruptly in the middle of the lobules. Seven patients recovered satisfactorily after surgery, one never reported for follow-up study, and two patients died, one 14 days and the other 71 months after surgery.

4258 HYPEROXALURIA IN DISEASES OF THE LIVER AND INTESTINES. (Ger.) Ruge, W.; Kohler, J.; Fromm, H.; Schindler, D.; Canzler, H. (Med. Klinik, Med. Hochschule, D-3000 Hannover, W. Germany). *Z. Gastroenterol.* 15(1):45-55; 1977.

Urinary oxalic acid was measured in 24-hr urine specimens by the method of Hodgkinson and Williams in 28 controls and in 97 patients with gastrointestinal diseases. Increased excretion of oxalic acid was found in patients with indigenous sprue (11 cases, including 5 on gluten-free diets), malabsorption syndrome (10), chronic pancreatitis (8), liver cirrhosis (10), Crohn's disease of the small intestine (12), resection of the small intestine (7) or of the small and large intestine (12), proctocolectomy (1), and Whipple's operation (1). Increases in urinary oxalic acid in acute pancreatitis or after partial resection of the small intestine (on bulk-free diet), partial resection of the large intestine, and the Billroth II operation were not statistically significant. Four patients had urinary calculi after resection of the small intestine or part of the pancreas. Reduction of fat content and bulk in the diet reduced the oxalate excretion. Hyperoxaluria correlated with fat elimination in the stools, $^{14}CO_2$-excretion in the expired air determined by the glycocholate breathing test, the vitamin B_{12} resorption test, and with the length of the resected portion of the intestines. Hyperoxaluria is due to increased absorption of oxalic acid from the diet. Its mechanism is not clear but failure of fat resorption appears to be an important factor.

4259 GROWTH IN HEIGHT AND BONE AND ENDOCRINE ABNORMALITIES IN 11 CASES OF HYPOPLASIA OF THE INTRAHEPATIC BILE DUCTS. (Fre.) Courtecuisse, V.; Dommergues, J. P.; Girard, F.; Limal, J. M. (Service de Pediatrie, Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, F 92140 Clamart, France). *Sem. Hop. Paris* 23(8/9):525-531; 1976.

Growth and bone and endocrine abnormalities were studied in 11 children with hypoplasia of the intrahepatic bile ducts associated with mental retardation (10), facies (9), and cardiovascular abnormalities (11). Six children had delayed body growth, five had major nonfusion vertebral anomalies, and two showed a rudimentary spondyloschisis. Distinct bilateral coxa valga was seen seven times. Other anomalies included bony transparencies. One patient had a low level of protein-bound iodine, and somatotropin function was abnormal in five of eight children, with a prolonged rise in plasma somatotropin levels during arginine or ornithine stimulation. The testicular index was low in six boys; testicular biopsy in four showed interstitial fibrosis, alone or associated with other abnormalities.

4260 EXPERIENCES WITH EXTRACORPOREAL PERFUSIONS WITH HETEROLOGOUS PIG LIVERS IN THE TREATMENT OF ACUTE LIVER INSUFFICIENCY. (Ger.) Keitel, R.; Otto, U.; Schwarzer, R.; Klotzer, B.; Mahnke, P. F.; Wegner, H.; *et al.* (Chirurgische Klinik des Bereichs Medizin der Karl-Marx-Universitat, Liebigstrasse 20, DDR-701 Leipzig, E. Germany). *Dtsch. Gesundheitsw.* 32(5):216-219; 1977.

Six extracorporeal perfusions with heterologous pig liver were performed in four patients with liver failure due to endocarditis (1), ammonium bichromate intoxication (1), and viral hepatitis (2). The duration of the perfusions ranged from 225 to 2,330 min. The liver was kept in a perfusion liquid consisting of an electrolyte solution (pH 7.4) containing heparin, procaine, and sodium bicarbonate. The perfusion was done via the superficial femoral artery and the great saphenous vein. It was stopped in one patient after 4 hr because of an outflow obstruction that resulted in capsule distension ruptures and bleeding. The livers showed their normal dark-red color during the entire perfusion periods. They produced bile, and the bilirubin values of the collected bile were definitely higher than the serum bilirubin values, which dropped within the first 60 min after the end of perfusion in each case. A drop in peripheral WBC count was detected shortly after the start of three perfusions. One patient developed an acute immune reaction that was controlled with prednisone. Overall, the patients tolerated the perfusions well, but they died 11 hr to 5 days after the end of treatment.

4261 ULTRASTRUCTURAL STUDY OF THE LIVER IN TWO CASES OF HEREDITARY TYROSINEMIA. (Fre.) Scotto, J. M.; Stralin, H. G.; Landrieu, P. (INSERM Universite Paris-Sud, Hopital d'Enfants, 94270 Le Kremlin-Bicetre, France). *Gastroenterol. Clin. Biol.* 1(2):139-149; 1977.

Two patients (a male and a female, 3 months old) whose parents were not consanguine, both showing Debre-Fanconi tubulopathy, hepatomegaly, and significant increases in serum alkaline phosphatase were diagnosed as having hereditary tyrosinemia. Low levels of prothrombin-complex factors were noted and serum alpha-fetoprotein (AFP) levels were elevated (>10 mg%). Ion exchange chromatography values of serum tyrosine and methionine were elevated (4 and 10 mg%, resp.); phenylalanine levels were normal (0.8-1.3 mg%). Hepatic parahydroxyphenylpyruvate oxidase activity was low (30% of normal). A tyrosine and phenylalanine poor regimen resulted in lowered tyrosine and methionine serum levels and amelioration of the tubulopathy, but did not alter AFP or coagulation factor levels. Both patients died after 6 months of life. Liver ultrastructure was similar in both cases; two cellular types were identified. The most frequent were well differentiated hepatocytes; the other type was smaller, had few cytoplasmic organelles, and was located chiefly at the periphery of hepatic trabeculae. Nuclear abnormalities, particularly nucleoar hypertrophy, proliferation of rough endoplasmic reticulum (RER), and the presence of cytosomes represented the most striking changes in differentiated hepatocytes. Changes similar to those observed in the experimental effect of ethionine or methionine diet overload (i.e., ATP depletion in the liver) were noted and are in agreement with the action of hypermethioninemia in tyrosinosis. Proliferation of RER may be due to an increased synthesis of a structural protein (perhaps AFP). In this case, abnormal but differentiated hepatocytes may be the site of AFP synthesis, and it is postulated that hepatocytes have a neoplastic behavior in advance of a malignant tumor appearance.

4262 REACTIONS OF D-PENICILLAMINE WITH COPPER IN WILSON'S DISEASE. (Eng.) Rupp, H.; Weser, U. (Physiologisch-chemisches Institut der Universitat, Hoppe-Seyler-Strasse 1, D-7400 Tubingen, W. Germany). *Biochem. Biophys. Res. Commun.* 72(1):223-229; 1976.

The mode of chelation of copper with D-penicillamine, a drug used in treatment of Wilson's disease, was determined by x-ray photoelectron spectroscopy. Wilson's disease is characterized by a continued production of copper-binding proteins in the liver, whereas these proteins are produced only neonatally in healthy individuals. The overproduction results in high concentrations of copper in the liver and other tissues, and abnormally low levels of blood ceruloplasmin. D-penicillamine was found to chelate with copper (Cu) in both of its oxidation states, Cu(I) and Cu(II), which increases the ability of penicillamine to bind copper regardless of the stage of the illness. Cu(II) was apparently mobilized by a reduction mechanism resulting in the complex RSSRCu(II). The formation of the complex $\frac{1}{n}[RSCu(I)]_n$ was most frequent and was shown to be successfully excreted in the urine of rabbits, with a yield of up to 39% of the i.v.-infused dose of D-penicillamine as the complex.

4263 LONG-TERM SURVIVAL OF A YOUNG WOMAN WITH LIVER CARCINOMA: DEMONSTRATION OF POSSIBLE RELATIONSHIP BETWEEN PRIMARY LIVER TUMORS AND SEX STEROIDS. (Fle.) Van Ganse, W.; Caenen, P. (Prinsenlaan 34, B 8400 Oostende, Belgium). *Tijdschr. Gastroenterol.* 19(4):263-280; 1976.

4264 HEPATIC INJURY AND ITS CONSEQUENCES. (Rus.) Chalganov, A. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Sov. Med.* (12): 35-40; 1976.

4265 CHRONIC CARDIAC LIVER: DIFFICULTY IN DIAGNOSING. COMPARATIVE VALUE OF COMPLEMENTARY EXAMINATIONS. (Fre.) Cassan, P.; Coulbois, J.; Dupuy, P.; Dorra, M. (Hopital Ambroise Pare, 9, av. Ch.-de-Gaulle, F 92100 Boulogne, France). *Nouv. Presse Med.* 5(30):1899-1900; 1976.

4266 CHANGES IN THE GASTROINTESTINAL TRACT IN PATIENTS WITH CHRONIC HEPATIC INSUFFICIENCY AFTER TREATMENT BY HEMODIALYSIS. (Rus.) Ryss, E.

S. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Klin. Med. (Mosk.)* 54(6):15-18; 1976.

4267 LIVER CELL FATTY DEGENERATION--SUBCLINICAL LIVER DAMAGE OR MORE? (Ger.) Metzner, C.; Kirsch, W. D.; Haupt, R.; Thierbach, V. (Medizin ischen Klinik des Bezirkskrankenhauses St. Georg, Strasse der DSF 141, DDR-7021 Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 32(3):78-81; 1977.

4268 DIAGNOSIS AND TREATMENT OF TRAUMATIC HEMOBILIA CAUSED BY INTRAHEPATIC PSEUDOANEURYSM. (Eng.) Arnesjo, B.; Dahl, E. P.; Fredlund, P.; Hegedus, V.; Ihse, I. (Dept. Diagnostic Radiology, Univ. Lund, S-221 85 Lund, Sweden). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 126(3):268-270; 1977.

4269 PATHOLOGY OF HEMOCHROMATOSIS. (Fre.) Tourneur, R. (Hopital Bichat, Service de Medecine II, 170, boulevard Ney, 75877 Paris Cedex 18, France). *Rev. Prat.* 27(7):353-358; 1977.

4270 SECONDARY HEMOCHROMATOSIS. (Fre.) Paraf, A.; Coste, T. (Hopital franco-musulman, 93009 Bobigny, France). *Rev. Prat.* 27(7):397-405; 1977.

4271 JAUNDICE AND PREGNANCY. (Spa.) Rodriguez Cuartero, A. (Facultad de Medicina, Hospital Clinico de San Cecilio, Universidad de Granada, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48 (2):249-266; 1976.

4272 HEPATIC TRANSPLANTATION. NECESSITY FOR PURSUING EXPERIMENTATION [Letter to Editor]. (Fre.) Germain, M.; Patricio, J.; Gremillet, C. (Hopital Henri Mondor F 94000 Creteil, France). *Nouv. Presse Med.* 5(39):2639-2640; 1976.

4273 HEPATIC TRAUMA. (Eng.) Mays, E. T. (Coll. Medicine, Univ. Kentucky, Lexington, KY). *Curr. Probl. Surg.* 13(11):1-73; 1976.

See also, 3753, 3905, 3912, 3914, 3928, 3929, 3940, 3941, 3942, 3943, 3944, 3945, 3946, 3948, 3949, 3950, 3951, 3959, 3960, 3961, 3964, 3965, 3966, 3969, 3971, 3972, 3974, 4011, 4013, 4091, 4106, 4213, 4214, 4221, 4296, 4306, 4323, 4333, 4338, 4342, 4347, 4348, 4358, 4382, 4411, 4456, 4460, 4461.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

4274 BROMOSULFOPHTHALEIN (BSP) HEPATIC CLEARANCE AND MORPHOLOGICAL ALTERATIONS IN ICTERIC CHOLESTATIC SYNDROME IN INFANCY. (Eng.) Neto, U. F.; Wehba, J.; Patricio, F. R.; Machado, N. (Rua Luiziania, 129 c/4. CEP. 04560, Sao Paulo, SP., Brazil). *Arq. Gastroenterol.* 13(4):265-271; 1976.

In 17 infants, age 6 days to 7 months, with the cholestatic icteric syndrome, hepatic function was evaluated by BSP clearance and liver morphology by percutaneous biopsy. Three types of graphs were obtained from the BSP clearance studies (5 mg/kg, injected i.v. in 30 sec): (1) curve associated with cholestasis and alterations in the hepatocytes, (2) curve associated with alterations in hepatocytes and minimal cholestasis, and (3) curve associated with slight alteration of hepatocytes and total bile duct obstruction. Liver function as evaluated by BSP clearance showed appreciable changes in the majority of the patients, and a direct relationship between the BSP clearance and morphological changes in the liver was observed in 88% of the patients.

4275 DUBIN-JOHNSON-SPRINZ SYNDROME: ASSOCIATION OF CONGENITAL HEMOLYTIC ANEMIA, CUTANEOUS PHOTOSENSITIVITY AND ABNORMAL PORPHYRIN METABOLISM. HUMAN VERSION OF THE MUTANT CORRIEDALE SHEEP? (Fre.) Heller, F.; Ninane, G.; Lebacq, E. G. (Rue Paul Pasteur, 42 B-7100 La Louviere, Belgium). *Acta Gastroenterol. Belg.* 40(1/2):77-85; 1977.

The case history of a woman with jaundice increasing through six pregnancies (a seventh pregnancy terminated in stillbirth) is presented. The patient had experienced abdominal pain and photosensitivity (dermal vesicles). Hepatosplenomegaly, microcytic anemia, hyperbilirubinemia, and an elevated alkaline phosphatase were noted at the time of the seventh pregnancy. A spontaneous amelioration was noted 2 weeks later: total bilirubin was between 2.2-4.6% (80% conjugated); alkaline phosphatase was 3.3 UB. However, prothrombin level was 70% (factors II, V, VII, and X were 60%, 45%, 70%, and 70%, resp.). BSP did not colorize the duodenal duct, and BSP serum levels increased progressively after a minimum value of 11% at 30 min. Laparoscopic liver biopsy was jet-black, and showed pigmented hepatocytes, moderate siderosis, and a megakaryocyte. Ultrastructurally, morphological changes in mitochondria were noted. Significant splenic sequestration was noted. Elevated levels of copro- and uroporphyrins were observed (secondary porphyrinurea). It is suggested that the Dubin-Johnson-Sprinz syndrome and beta-heterozygous thalassemia with concordant hypersplenism could account for the abnormal porphyrin metabolism found in this patient. The clinical picture observed in these associated syndromes is compared with that described in mutant Corriedale sheep.

4276 THE EFFECT OF PHENOBARBITAL ON PATIENTS WITH DUBIN-JOHNSON SYNDROME. (Eng.) Merdler, C.; Burke, M.; Shani, M.; Felner, S.; Lurie, I. (Dept. Medicine, Ichilov Medical Center, Tel Hashomer, Tel Aviv Univ., Tel Aviv, Israel). *Digestion* 14(5/6):394-399; 1976.

Eleven patients with Dubin-Johnson jaundice were treated with phenobarbital (100 mg, p.o., t.i.d. for 2 weeks); no other medications were given during this time. The side-effects observed were somnolence, which subsided after 2-3 days, and constipation, which affected only four patients. Total bilirubin concentrations decreased significantly ($p<0.01$) in all patients, from an average before treatment of 4.65 ± 0.9 mg/100 ml to 1.32 ± 0.81 mg/100 ml; direct bilirubin fell from an average of 3.6 mg/100 ml to 1.05 mg/100 ml ($p<0.05$); and indirect bilirubin also decreased. The ratio of direct to total bilirubin was not altered significantly; it changed from 0.78 ± 0.5 to 0.79 ± 0.4. The hepatic clearance of BSP after i.v. administration of a 5-mg/kg dose was not significantly enhanced at 45 min, but at 120 min, the enhancement was significant ($p<0.01$). Significant changes were not observed in SGOT, serum alkaline phosphatase, cholesterol, or plasma proteins. The BSP tolerance test demonstrates that Dubin-Johnson syndrome is caused by a defect in the excretory liver function. The study further demonstrates that phenobarbital can alter certain hepatic functions. More study is needed on icteric patients with Dubin-Johnson syndrome to determine the site of action of phenobarbital, its long-term effects, and its optimal effective dosage.

4277 JAUNDICE IN THE NEWBORN: ALGORITHMIC DIAGNOSIS OF CONJUGATED AND UNCONJUGATED HYPERBILIRUBINEMIA. (Eng.) Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA 94122). *JAMA* 237(1):58-62; 1977.

The use of algorithms in the differential diagnosis of jaundice in newborns and young infants is discussed on the basis of studies on bilirubin metabolism, causes of unconjugated neonatal bilirubinemia, and conditions associated with conjugated hyperbilirubinemia. The fraction diazo reaction on serum was used to measure the total bilirubin level and the conjugated fraction in the jaundiced infant; hyperbilirubinemia can thus be classified as conjugated or unconjugated (<15% of total bilirubin conjugated). The presence of unconjugated hyperbilirubinemia at birth to 2 days of age may indicate erythroblastosis. The key determination is the direct Coombs test, which is used to detect blood type incompatibility. The majority of infants with unconjugated hyperbilirubinemia at 3-7 days of age have physiologic hyperbilirubinemia, which may be complicated by prematurity, hypoxic states, acidosis, or hypoglycemia. Several congenital hematological disorders (RBC enzymopathies, spherocytosis, aplastic or hypoplastic anemia), hypothyroidism, and perinatal complications (hemorrhage, sepsis) may be manifested by unconjugated hyperbilirubinemia at 1-8 weeks of age. In conjugated hyperbilirubinemia, the main diagnostic problem is to distinguish intrahepatic from extrahepatic causes. Standard liver function tests are not helpful for this purpose in early infancy, with the exception of the occurrence of rapidly rising serum alkaline phosphatase and cholesterol concentrations; this suggests involvement of intrahepatic terminal bile ducts in a destructive process, which leads to intrahepatic biliary hypoplasia or paucity of interlobular bile ducts. The presence of characteristic facies, congenital heart defects, and vertebral malformations help to identify intrahepatic biliary hypoplasia.

4278 APOA-I AND A-II CONCENTRATIONS IN PROLONGED OBSTRUCTIVE JAUNDICE (POJI) OF INFANCY [Abstract]. (Eng.) George, P. K.; Zvargulis, J. E.; Keating, J.; Schonfeld, G. (Dept. Preventive Medicine, Washington Univ., St. Louis, MO). *Clin. Res.* 25(3):311A; 1977.

See also, 4246, 4305.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4279 ELECTRON MICROSCOPIC PICTURE OF OXYPHENISATIN-INDUCED LIVER LESION. (Ger.) Merker, H. J.; Henning, H.; Vogel, H. M. (Freie Universitat Berlin, Berlin, W. Germany). *Z. Gastroenterol.* 14(8):779-795; 1976.

Biopsy samples obtained during laparoscopy of 20 patients with oxyphenisatin-induced liver damage were studied by electron microscopy. The cells in the lesions showed nuclear changes (nucleolar segregation and chromatin condensation), fragmentation and "disarrangement" of the endoplasmic reticulum, and loss of ribosomes; mitochondrial swelling was observed only in some of the cells. Lipid inclusions and isolated inclusions were interpreted as lysosomal restiform bodies. The attack point of oxyphenisatin (phenolisatin) preparations may be the cell nucleus or nucleolus. Pathological changes described by light microscopy studies are corroborated by electron microscopy.

4280 INHIBITION OF GALACTOSAMINE HEPATITIS IN THE RAT BY α_M-FETOPROTEIN: AN ACUTE PHASE REACTANT [Abstract]. (Eng.) van Gool, J.; de Nie, I.; Boers, W. (Lab. Experimental Medicine, Wilhelmina Gasthuis, Univ. Amsterdam, Netherlands). *Digestion* 14(5/6):516-517; 1976.

4281 ISONIAZID FULMINANT HEPATITIS IN PATIENTS RECEIVING RIFAMPICIN: A POSSIBLE CONSEQUENCE OF ENZYME INDUCTION [Abstract]. (Eng.) Pessayre, D.; Bentata, M.; Degott, C.; Nouel, O.; Miguet, J. P.; Rueff, B.; *et al.* (Hopital Beaujon, Clichy, France). *Digestion* 14(5/6):535; 1976.

See also, 3930, 4459.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4282 RISK OF HEPATITIS TRANSMISSION BY GASTROSCOPY? (Ita.) Massarat, S.; Urban, M.; Schiff, W. (Medizinische Universitats-Poliklinik, Robert-Koch-Str. 7a, 355 Marburg, W. Germany). *Minerva Med.* 66(63):3257-3260; 1975.

The risk of hepatitis contamination by gastroscope was evaluated in 211 patients with various gastroenteric diseases. Five of the patients (three with chronic hepatitis, one with achlorhydria, and one with duodenal ulcer) were hepatitis B antigen-positive before gastroscopy, while one patient with cirrhosis of the liver was hepatitis B antibody positive. All patients were subjected to gastroscopy performed with the same gastroscope (Olympus GIF type D), which, before each gastroscopy, was first washed with water, then immersed for 20-30 min in a commercial disinfecting solution, and finally passed through 70% alcohol. The evaluation was made about 2 months (59 ± 8 days) after gastroscopy in 200 patients (8 died before the examination; 3 did not return for checkup), and also about 4 months (124 ± 14 days) after gastroscopy in the remaining 196 (4 other patients died between the first and second evaluation). Only 2/206 hepatitis B antigen-negative patients (1 with carcinoma of the stomach and 1 with liver cirrhosis) were found to be hepatitis B antigen positive after gastroscopy. However, the presence of the hepatitis B antigen was attributed to albumin infusions received after gastric surgery in the first patient, and to the pre-existing disease in the second. Another patient, with gastric ulcer, became hepatitis B antibody-positive. The possibility of hepatitis contamination by gastroscopy is very remote, and a routine determination of the hepatitis B antigen before gastroscopy does not appear to be required. It is not known whether the absence of contamination was due to insufficient quantities of virus or to the virucidal action of the disinfecting method.

4283 VERTICAL TRANSMISSION OF VIRAL HEPATITIS TYPE B. (Cze.) Vanista, J. (Infekcni klinika University Karlovy, 180 81 Prague 8-Bulovka, Czechoslovakia). *Cas. Lek. Cesk.* 116(7):193-196; 1977.

Twenty children (aged 2 weeks to >4 yr) of mothers with hepatitis B of pregnancy or in pueriperium were studied for the presence of the hepatitis B (HB) antigen in the serum using reverse immunoelectrophoresis. The antigen was found in six children. Internal clinical findings in these children were normal, but in four, there were biochemical signs of liver damage (anicteric pathology in 2, serum transaminase levels at the upper limit of normal in 2). The presence of HB in pregnant or puerperal women may thus result in vertical transmission of the infection from mother to child, particularly if the mother contracts the infection during the final months of pregnancy or during puerperium, and especially if the antigen is present in the mother's body at the time of childbirth. HB antigen was not detected in either umbilical blood of the mother's milk. Certain measures should be taken to ensure early detection of perinatal transmission of HB antigen in pregnant women with HB and to monitor the health of their children. Mothers with HB antigenemia should not nurse their children. No prophylactic effect of normal immunoglobulin was noted.

4284 INTRAUTERINE VIRAL HEPATITIS. (Rus.) Bulatkina, Z. G. (Leningrad Pediatric Medical Inst., Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 21(10):20-22; 1976.

The effects of viral hepatitis were studied in 51 children (40 neonates and 11 stillborns) and in 127 pregnant women and their fetuses (128). During pregnancy, 78.4% of the mothers had various diseases: 24.9% had hepatitis and 18.3% had viral respiratory infections. Severe forms of congenital hepatitis were recorded in 70% of the patients: 68.6% of the children had chronic hepatitis with cirrhosis and 11 neonates died of hepatitis. All neonates had elevated bilirubin levels (5.7 ± 0.6 mg%); bilirubin content was maximum in cirrhotic patients (14.2 ± 1.2 mg%). In the 127 pregnant women, 54.3% had premature births or miscarriages (14.1% stillborns) and 1.6% of the children had congenital malformations. Subclinical manifestations of hepatitis were observed in 11 newborns. Of 18 stillborns, 3 had jaundice and 7 showed enlargement of the liver. Fifty children were followed up for 4-10 yr; dysgenesis (syndactylia, third eyelid, and hard palate) were frequently observed and 16% of these children were mentally retarded.

4285 HEPATITIS B VIRUS INFECTION IN DENTAL SURGICAL PRACTICE.

(Eng.) Goubran, G. F.; Cullens, H.; Zuckerman, A. J.; Feddleston, A. L. W.; Williams, R. (Queen Victoria Hosp., East Grinstead, Sussex, England). *Br. Med. J.* 2(6035): 559-560; 1976.

Sixty-one dental surgeons were interviewed to establish the incidence of attacks of viral hepatitis and to relate this to environmental risk factors. Six (10%) had a history of hepatitis, in one case due to infection with the hepatitis B virus. Screening blood of the 61 subjects for hepatitis B surface antigen (HBsAg) by radioimmunoassay showed no carriers of the antigen, but transient antigenemia was observed in one dentist. Antibody to HBsAg was detected in four dentists (7%), only one of whom had had clinical hepatitis. Dental surgeons may be more at risk from infection with the hepatitis B virus than the general population, although this risk should be minimized in hospital practice, where most infected patients will already have been identified and appropriate precautions can be taken. The risk of transmission from an antigen-positive dentist to his patients is probably much smaller than the risk to the dentist from his patients, and there is no evidence to indicate that he should restrict his clinical activities.

4286 OBSERVATIONS ON 2000 CHRONIC CARRIERS OF HBs ANTIGEN.

(Fre.) Courouce-Pauty, A. M.; Soulier, J. P. (Centre National de Transfusion Sanguine, 6, rue Alexandre-Cabenel, 75739 Paris, France). *Sem. Hop. Paris* 53(22/23):1327-1335; 1977.

The evaluation of 2,000 blood donors for the presence of hepatitis B antigen (HBsAg) was carried out since 1969, and the findings are related to donor age, sex, blood group, liver function tests, and where possible, to familial incidence. The incidence of HBsAg was four times greater among French donors than non-French donors, and three times greater among men than women. Donors younger than 35 yr were twice as likely to be HBsAg+, and the incidence increases again after 54 yr. The major sub-types *ad/ay* ratio in French donors is 2.6 and does not vary with age. In group O donors it is 1.6. Of the HBsAg donors, 78.5% had normal liver function tests (women, 91.5%; men, 73.4%); high HBs titers were observed in 45.6%. The incidence of eight HBsAg subtypes in 11 countries represented by the screened blood donors is presented. The most frequently appearing subtype was *adw* 2 (69.7% of the French and 72% of the Antilles sample). Intrafamilial incidence was noted in 39/2,000 donors (19 families). The findings of the present study are compared with those reported in the literature. The higher frequency of HBsAg in Mediterranean and tropical countries; the absence of correlation between the ABO system and HBsAg; the correlation between sex, age, and HBsAg incidence; and the proportion of subtypes as a function of age and country of origin are in agreement with previously reported data.

4287 PROGNOSIS OF VIRAL HEPATITIS IN CHILDREN: REPORT OF 470 PATIENTS BEING CARED FOR AT HOME.

(Fre.) Toppet, M.; Rodesch, P.; Cadranel, S. (Avenue Gabriel Faure 4, B-1190 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(9/10):334-339; 1976.

The prognosis of 470 cases of childhood viral hepatitis (VH) over a 5-yr period is reported. Hepatitis B surface antigen (HBsAg) was determined in 391 children, mainly by complement fixation and/or immunoelectrophoresis. The frequency of type A VH was very high at 5 yr of age and it usually peaked in January and September. This was not evident in type B VH. Children were considered cured if the results of clinical tests and hepatic function (essentially the transaminases) became normal. Type A VH is usually cured within 4 weeks, but type B VH is more persistent. Of 65 children with type B, 13 had a chronic course lasting longer than 6 months, compared with 6/274 patients with type A. A liver biopsy by laparoscopy in 34 children with an unfavorable course in two. The results demonstrated that type B VH is more aggressive than type A in children and that clinical recovery should not be assumed unless confirmed by biological data. A histological examination should be performed after the first 4 months of evolution of VH, especially if the HBsAg persists in the blood.

4288 INTRAHEPATOCYTIC LOCALIZATION OF HBs AND HBc ANTIGENS: AN IMMUNOFLUORESCENCE AND IMMUNO-ULTRASTRUCTURAL STUDY.

(Fre.) Thery, J. P.; Stoebner, P.; Bonnet-Eymard, J. (C.H.U. de Grenoble, Les Sablons, 38700 La Tronche, France). *Gastroenterol. Clin. Biol.* 1(2):117-126; 1977.

The results of indirect immunofluorescence, conventional electron microscopy, and indirect immunoelectron microscopy (with peroxidase) used to determine the localization of surface (HBs) and core (HBc) hepatitis B antigens (Ag) in hepatocytes are presented. The study was done on seven HBs+ patients and one control patient with gastric carcinoma. Serum HBsAg levels were determined by electroimmunodiffusion and passive hemagglutination. In the presence of anti-HBs antibodies, peroxidase invariably stained the cytoplasm but never the nucleus. In these peroxidase-stained cells, HBsAg was localized in smooth endoplasmic reticulum and in the tubular formations they contained. The hepatocyte nuclei of serum HBsAg+ patients contained spherical particles (average diameter=19 nm) in a generally circular formation, several of which contained a central osmophilic punctation. Following incubation with anti-HBc antibodies, dense, homogeneous nuclear fluorescence was noted; the cytoplasm was clear. The same effect was noted with anti-HBc antibodies in the presence of peroxidase.

4289 IDENTIFICATION OF HBs ANTIGEN BY INDIRECT IMMUNOFLUORESCENCE ON PARAFFIN SECTIONS OF THE LIVER IN PATIENTS WITH DIFFERENT TYPES OF VIRAL HEPATITIS.

(Fre.) Molas, C.; Voillemot, N.; Potet, F. (Hopital Beaujon, Clichy, France). *Gastroenterol. Clin. Biol.* 1(3):249-256; 1977.

An evaluation of hepatitis B specific antigen (HBsAg) in 53 liver biopsies from 50 patients (30 HBsAg+; 20 HBsAg-) is presented. Chief pathology among the controls were: HBsAg-negative hepatitis (5/20), chronic alcoholism (8/20), hematologic disorders (3/20), infections (2/20), tumoral (1/20), and cardiac (1/20). On the basis of clinical, biological (sedimentation rate, gammaglobulins, and transaminases), histological, and evolutive evidence, serum HBs+ patients were classed in five groups: healthy carrier (11), acute hepatitis (4), persistent chronic hepatitis (6), active chronic hepatitis (2), and cirrhosis (7). Several sections of biopsies from each patient were fixed separately in Bouin's and paraformaldehyde solutions. Immunofluorescence examination was carried out by standard technique on deparaffinized sections incubated first in anti-HBs sheep serum and then in fluoresceine-labeled rabbit anti-sheep serum, and the number of positive cells noted (1-5%=+1; 10-40%=+2; 50%=+3). Results from both Bouin's and paraformaldehyde fixed material were the same, but background fluorescence was more significant in the Bouin's prepared sections. When HBsAg is present it is invariably cytoplasmic, never nuclear. HBsAg was noted in the cells of all patients with HBsAg + serum. Distribution and abundance of hepatocytic HBsAg differed markedly from patient to patient, and no correlation with type of liver pathology was noted. Only a few patients with HBsAg+ serum demonstrated "ground glass" hepatocytes. The latter were orcein as well as HBsAg+.

4290 DETECTION OF HBs AND HBc ANTIGENS IN HUMAN LIVER BIOPSIES BY IMMUNOFLUORESCENCE AND ORCEIN STAINING.

(Fre.) Buffet, C.; Briantias, M. J.; Chaput, J. C.; Rain, B.; Martin, E.; Etienne, J. P. (Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, 94241 Clarmont, France). *Gastroenterol. Clin. Biol.* 1(2):127-137; 1977.

Human hepatic hepatitis B surface (HBs) and hepatitis B core (HBc) antigens were evaluated by indirect immunofluorescence and orcein staining in 80 liver biopsies from 71 patients. Of these, 56/71 patients (65 biopsies) were serum HBs carriers, and were classed into four groups: acute viral hepatitis (19), chronic hepatopathy with and without cirrhosis (29), and asymptomatic chronic carriers (8). Fifteen biopsies from 15 patients lacking serum HBs tigen comprised the remainder of the study material. HBs-positive cells showed a cytoplasmic fluorescence; HBc-positive cells showed a nuclear fluorescence. Hepatocytes from serum HBs-negative patients showed neither cytoplasmic nor nuclear fluorescence. Of 19 biopsies from acute viral hepatitis patients, 1 was positive by indirect immunofluorescence. Of 20 biopsies from patients with chronic hepatitis without cirrhosis, 10 were positive; 8/18 biopsies from patients with chronic hepatitis with cirrhosis were positive. All eight biopsies from eight chronic asymptomatic carriers were positive. The results indicate that: 1) the number of positive hepatocytes in relation to the total number of hepatocytes is low in the majority of cases; 2) there appears to be no difference between types of liver pathology and the number of positive hepatocytes; 3) distribution of positive hepatocytes is diffuse in chronic hepatitis without cirrhosis, and focal in chronic hepatitis with cirrhosis; and 4) there is no correlation between serum HBs-positive levels and the number of positive hepatocytes in corresponding biopsy material. It was also noted that HBc fluorescence was never positive in patients with acute viral hepatitis.

4291 ORCEIN POSITIVE HEPATOCELLULAR MATERIAL IN LONG-STANDING BILIARY DISEASES. I. HISTOCHEMICAL CHARACTERISTICS.

(Eng.) Sipponen, P. (Central Lab. Pathology, Univ. Helsinki, Helsinki, Finland). *Scand. J. Gastroenterol.* 11:545-552; 1976.

Histochemical studies were made to determine the composition of an orcein-positive material observed to accumulate in liver cells during long term biliary diseases. Liver biopsies from five patients with primary biliary cirrhosis were studied. The material became orcein-positive after previous oxidation. Staining reactions of the material with orcein at pH 2.0 and aldehyde fuchsin or alcian blue at pH 0.2 under various conditions indicated the presence of sulfonic acid residues and that the material is protein in nature. Positive Rubeanic acid and Mallory-Parker's hematoxylin tests in the area of orcein-positive material indicated that the protein is complexed with copper. The staining characteristics of the orcein-positive material were different from those caused by bile pigments as well as various orcein-positive factors that may occur in liver diseases, such as lipofuschins and viruses. The possibility is raised that the accumulation of copper-protein complexes in liver cells indicates insufficient excretion of bile and a progression of biliary disease to cirrhosis.

4292 INHIBITORY ACTIVITY IN SERA FROM PATIENTS WITH ACUTE AND CHRONIC HEPATITIS AND ITS CLINICAL SIGNIFICANCE.

(Eng.) Brattig, N.; Berg, P. A. (Medizinische Universitatsklinik, D-74 Tubingen, W. Germany). *Minerva Gastroenterol.* 22(3):191-198; 1976.

The inhibitory serum factors that block phytohemagglutinin (PHA)-induced transformation of lymphocytes in sera from patients with acute and chronic liver diseases were studied to learn the clinical significance of these blocking factors. The use of this inhibition reaction as a prognostic marker in various forms of chronic liver disease was also investigated. Thirteen patients with acute hepatitis B surface antigen (HBsAg)-positive viral hepatitis were tested for PHA-induced lymphocyte transformation, and sera from nine patients with viral hepatitis were tested for inhibitory activity. Inhibition was also measured in 35 patients with chronic hepatitis, 10 with primary biliary cirrhosis, 14 with pseudolupus erythematosus, 24 with collagen disease, and 15 with myocardial infarct. In the sera from the nine patients with acute viral hepatitis, inhibitory activity was observed only transiently at the early stage of the disease. Sera from patients with chronic hepatitis showed only a weak inhibition. Inhibitory activity was also observed in sera from patients with various other diseases, especially patients with lupus erythematosus, rheumatoid arthritis, and drug-induced pseudolupus erythematosus. Sera from patients with myocardial infarct did not inhibit lymphocyte transformation. Inhibitory activity was not influenced by factors like HBsAg, increased bilirubin levels, or other biochemical factors. Since lymphotoxic antibodies are found in many viral diseases one could postulate that T-cell antibodies may arise as a result of cross-reaction between viral and lymphocyte surface antigens. Blocking of T-lymphocyte activity may be caused by antigen-antibody complexes in a specific and nonspecific way: specifically, by the binding via the antigen and unspecifically, via the Fc receptor.

4293 ALPHA-1-FETOPROTEIN IN ACUTE HEPATITIS.

(Ita.) Furfaro, M.; Pesce, G. (Ente Ospedaliero San Paolo, Savona, Italy). *Pathologica* 67(965/966):125-129; 1975.

The possible presence of α-1-fetoprotein (AFP) was studied in samples of blood serum from 692 patients with acute liver disease of presumable viral origin (506 with infectious hepatitis; 86 with serum hepatitis); sera from the umbilical cord blood of 100 normal newborn babies, and from 100 healthy adults were also tested. The investigation was made with the "Mancini's Technique," using commercial Hoechst-Behringwerke "immunoplates;" this immunochemical method has an optimum detection limit of 1 mg/100 ml and is much less sensitive than radioimmunoassays (RIA). The results showed no AFP presence in the 692 patients with hepatitis and the 100 healthy adults. AFP was readily detectable in the blood serum of all 100 newborn. The results corroborate previous reports that icterogenic acute hepatitis, with long or short incubation and with or without presence of hepatitis B antigen or its corresponding HB antibody, does not induce an active hepatic regeneration process and consequent appearance of high AFP levels. Only exceptional cases of liver diseases and some neoplasms (hepatoma; teratoblastoma) may induce recuperation of the AFP synthesis with appearance of high AFP levels detectable by immunochemical methods. Immunochemical methods are useful in the diagnosis of primary hepatic carcinoma and testicular teratoblastoma, while very small amounts of AFP can only be detected by RIA methods.

4294 NOTES ON THE EFFECT OF A PHOSPHORYLATED GLYCO-DERIVATIVE IN 30 CASES OF ACUTE VIRAL HEPATITIS.

(Ita.) Fiori, G. P.; Mazza, L. (Divisione Malattie Infettive e Laboratorio di Patologia Clinica, Ospedale Civile, Alessandria, Italy). *Minerva Med.* 67(12):732-740; 1975.

The effects of treatment with uridine diphosphate glucose (UDPG) on clinical symptoms and laboratory parameters indicative of hepatic function impairment were studied in 30 patients with acute viral hepatitis. The UDPG was administered in 500 cm^3 of 15% levulose solution in two different doses: 50 mg/day x 16-34, i.v., in 15 patients and 20 mg/day x 19-55, i.v., in the other 15 patients. All patients received supplementary treatment with a preparation of liver extract plus vitamin B_{12} and a polyvitamin preparation plus a hepatoprotective substance. Clinical evaluations made on the 7th and 15th days of treatment showed a definite diminution of the asthenia, dyspeptic and intestinal disturbances, hepatomegaly, splenomegaly, and urinary pigmentation; a linear decrease was noted in the levels of total and direct reaction bilirubin, SGOT, SGPT, alkaline phosphatase, serum Fe, proteinemia, hemoglobin (Hb), and glycemia. Linear increase of the albumin-to-globulin ratio, hypothrombinemia, and fecal pigmentation was also noted. The rate of effectiveness was similar with both doses, except for proteinemia in which the linearity was valid only with the 20-mg dose, and for Hb and glycemia in which it was valid for the 50-mg dose only. The overall results, however, indicated the superiority of the 50-mg dose. Most of the parameters studied showed a tendency towards normalization at the end of the treatment; there were no side-effects. The statistical evaluation of the results confirmed the validity of the clinical observations. The authors imply that UDPG is definitely active and therapeutically effective in the treatment of acute severe liver diseases.

4295 VARIATIONS IN PLASMA AMINO ACIDS DURING SEVERE HEPATITIS WITH ENCEPHALOPATHY.

(Fre.) Delafosse, B.; Bouletreau, P.; Motin, J. (Hopital Edouard Herriot, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(14):1207-1211; 1977.

Plasma amino acid (PAA) levels were monitored 36 times in 10 patients in the course of severe viral hepatitis with encephalopathy (9) or toxic hepatitis from *Ammanita phalloides* mushroom (1) and in 12 healthy controls. At the time of hospitalization, prothrombin levels were less than 20%, and the SGOT levels varied from 1,900-5,000 U; blood ammonia ranged from 130 to 200 μg/100 ml. Glucose was given i.v. and stage II and III comatous patients were also given artificial respiration. Only 4/10 patients survived, and 6/10 died within 24 hr to 11 days after admission. Plasma levels of the aromatic amines, phenylalanine, tyrosine, and methionine were identical in controls and subjects with hepatocellular failure without encephalopathy (3 patients), while they were significantly elevated in hepatic encephalopathy (7 patients). No variations in aliphatic acid amines (valine, leucine, and isoleucine) were noted in controls, and they were below normal in patients with or without encephalopathy. A significant decrease was noted only in valine levels in patients with hepatocellular disease without encephalopathy. Other PAA levels were only elevated in cases of hepatic encephalopathy. The molar ratio of aliphatic amino acids to aromatic amino acids decreased significantly in conscious patients with severe hepatocellular failure and dropped significantly in patients with hepatic encephalopathy. No relation between PAA levels and the degree of encephalopathy was noted.

4296 CONTRASTING FEATURES AND RESPONSES TO TREATMENT OF SEVERE CHRONIC ACTIVE LIVER DISEASE WITH AND WITHOUT HEPATITIS Bs ANTIGEN. (Eng.) Schalm, S. W.; Summerskill, W. H. J.; Gitnick, G. L.; Elveback, L. R. (Mayo Clinic and Mayo Foundation, Rochester, MN). *Gut* 17(10):781-786; 1976.

A comparison of hepatitis B surface antigen (HBsAg)-positive and negative patients with severe chronic active liver disease (CALD) was made to investigate differences in response to therapy as well as to clarify variations in initial clinical and immunoserological features. HBsAg-positive patients were predominantly males (89%) over the age of 40 yr (median age, 52 yr) and more frequently failed to respond to conventional treatment programs with prednisone. In contrast, HBsAg-negative patients were more often female (70%) and younger (median age, 35 yr), had a higher incidence of associated immunopathic disease and immunoserological markers in high titer, and more often responded to treatment with full remission of their disease. The percentages of clinical and biochemical resolutions, histological remissions, treatment failures, and deaths among 82 HBsAg-negative patients were 80, 68, 16, and 11%, resp., as compared to corresponding percentages of 46, 15, 46, and 31%, resp., for 13 HBsAg-positive patients. The 2-yr survival for the 82 HBsAg-negative patients over 90% as compared with less than 70% for the 13 HBsAg-positive patients and about 50% for 29 control patients (26 HBsAg-negative and 3 HBsAg-positive patients). Initial responses of HBsAg-positive patients to 69-mg/day doses of prednisone or to prednisone (30 mg/day) in combination with azathioprine (50 mg/day) were usually as favorable as in HBsAg-negative patients. However, when the doses were reduced to conventional maintenance levels (20 mg/day), biochemical deterioration followed in 6 of 11 surviving HBsAg-positive patients and in only 1 of 13 HBsAg-negative patients. Reinstitution of higher prednisone doses resulted in biochemical improvement in all patients. Among 10 HBsAg-positive patients who were followed for more than 1 yr, antigen persisted in 8, 7 of whom have required continuing treatment. In two patients (under 40 yr of age) antigenemia was transient; one reached full remission and discontinued treatment 2 yr ago. The benefit/risk ratio of both conventional and high doses of prednisone in HBsAg-positive severe CALD requires further clarification.

4297 ABSENCE OF COMPLETE HOMOLOGOUS IMMUNITY IN HEPATITIS B INFECTION AFTER MASSIVE EXPOSURE. (Eng.) Trepo, C. G.; Prince, A. M. (New York Blood Center, New York, NY). *Ann. Intern. Med.* 85 (4):427-430; 1976.

The question of whether immunity to hepatitis B infection can be overcome by massive challenge doses was studied in three experimentally challenged chimpanzees. Observations were also made in 299 cardiac surgery patients after blood transfusions. Thirteen patients showed an anamnestic antibody response to hepatitis B surface antigen (anti-HBsAg); an eightfold or greater titer rise occurred within 4 weeks of transfusion. Three of these patients developed anicteric, asymptomatic hepatitis. The three chimpanzees developed hepatitis and hepatitis B surface antigenemia when challenged with hepatitis B virus that had an antigenic subtype identical to that used in the primary infection. This response provides evidence against the role of differences in antigenic composition of initial and challenge strains of virus as an explanation for incomplete homologous immunity. The results indicate that immunity to hepatitis B infection can be overcome by massive challenge doses.

4298 DEVELOPMENT OF IMMUNITY AGAINST HEPATITIS A VIRUS BY SUBCLINICAL INFECTION. (Eng.) Villarejos, V. M.; Gutierrez-Diermissen, A.; Anderson-Visona, K.; Rodriguez-Aragones, A.; Provost, P. J.; Hilleman, M. R. (Intl. Center for Medical Research and Training, San Jose, Costa Rica). *Proc. Soc. Exp. Biol. Med.* 153(2):205-208; 1976.

A new immune adherence test for hepatitis A antibody was applied to etiologic investigations of 25 cases of subclinical hepatitis diagnosed by serum enzyme elevations. Eighteen cases seroconverted and were diagnosed as hepatitis A, four were hepatitis B surface antigen, and three cases were neither A nor B. The 18 patients with hepatitis A antibody were followed up for 2-7 yr, and the antibody titers remained unchanged during this period. The development of hepatitis A antibody equates with protection against the disease and confirms the suggestion that immunity may result from clinically inapparent infection.

4299 IMMUNE MECHANISMS IN HEPATITIS B: NEW ASPECTS AND PRACTICAL CONSEQUENCES. (Fre.) Frei, P. C. (Departement de medecine, CHUV, CH-1011, Lausanne, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):510-514; 1977.

A review of the different types of immune responses occurring during hepatitis B infections shows that the specific responses for hepatitis B surface antigen (HBsAg) are important in the pathogenesis of chronic liver disease. Anti-HBsAg antibodies are only detected in the serum several weeks after infection commences. These antibodies are not cytolytic by themselves nor do they exert a protective effect when the virus is already intracellular. Antibodies to HBsAg have been demonstrated on circulating lymphocytes. When purified, HBsAg is capable of the *in vitro* induction of blastogenesis in individual lymphocytes of patients who have recovered from acute hepatitis. The leukocyte migration inhibition test performed before and after acute hepatitis B and in asymptomatic carriers indicates that the hepatic lesion is probably due to cell-mediated immunity for HBsAg, which causes cytolysis of the hepatocytes. Immune complexes were detected in 14/19 patients with chronic active hepatitis, 13/17 patients with posthepatic cirrhosis, and in 13/18 patients with acute hepatitis. They were also present in 10/18 patients with persistent hepatitis, 7/15 asymptomatic carriers, and in 1/10 patients cured of acute hepatitis. These complexes may play a pathogenic role in some forms of chronic active hepatic diseases.

4300 CORRELATION OF WEDGED HEPATIC VEIN PRESSURE (WHVP) AND LIVER BIOPSY IN VIRAL HEPATITIS [Abstract]. (Eng.) Suzuki, K.; Peters, R.; Redeker, A.; Omata, M. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Clin. Res.* 25(2):153A; 1977.

4301 SOME CLINICAL ASPECTS OF SERUM HEPATITIS. (Rus.) Pletnyov, V. M. (Dept. Infectious Diseases, Kiev Advanced Training Inst. for Physicians, Kiev, USSR). *Vrach. Delo* (10):139-144; 1976.

4302 HEPATITIS B ANTIGEN: ISOLATION, CHARACTERIZATION AND REACTION WITH VARIOUS PLATINUM SALTS [Abstract]. (Eng.) Burgess, T. E. (Villanova Univ., Villanova, PA). *Diss. Abstr. Int. [B]* 37(6):2817B; 1976.

4303 e ANTIGEN IN ACUTE AND CHRONIC LIVER DISEASE [Abstract]. (Eng.) Thamer, G.; Gmelin, K.; Bartsch, U.; Kommerell, B. (Medizinische Universitats-Klinik, Gastroenterology Unit, Heidelberg, W. Germany). *Digestion* 14(5/6):487-488; 1976.

4304 THE SPREAD OF VIRAL HEPATITIS IN ITALIAN DIALYSIS UNITS. (Eng.) Piccinino, F.; Guisti, G. (Clinica delle Malattie Infettive, 1° Facolta di Medicina, Universita di Napoli, Via Cotugno 1, J-80135, Napoli, Italy). *Acta Hepatogastroenterol.* 23(6):392-398; 1976.

4305 DIALYSIS OF BLOOD SERUM BILIRUBIN AND BILIRUBINEMIA IN VIRAL HEPATITIS AND SUBHEPATIC MECHANICAL JAUNDICE. (Rus.) Sorinson, S. N.; Tsybasova, A. I. (Dept. Infectious Diseases, Gor'kii S. M. Kirov Medical Inst., Gor'kii, USSR). *Klin. Med. (Mosk.)* 54(10):72-75; 1976.

4306 DIFFERENTIAL DIAGNOSIS OF ACUTE FORMS OF VIRAL HEPATITIS AND JAUNDICE VARIANTS OF NONICTERIC LEPTOSPIROSIS. (Rus.) Belov, G. F.; Kunina, N. A.; Sakharova, E. G. (Dept. Infectious Diseases, Novosibirsk Medical Inst., Novosibirsk, USSR). *Klin. Med. (Mosk.)* 54(10):75-78; 1976.

See also, 3942, 3956, 4252, 4253, 4267, 4307, 4309, 4310, 4313, 4329.

LIVER AND BILIARY TRACT

Chronic Hepatitis

4307 CHARACTERISTICS OF THE COURSE OF CHRONIC HEPATITIS IN CHILDREN WITH HEPATITIS B ANTIGEN. (Rus.) Glozand, I. V.; Blagoslovensky, G. S.; Popova, L. A.; Bragin, V. P. (Leningrad Scientific Res. Inst. of Children's Infections, Leningrad, USSR). *Pediatriia* 7:21-24; 1976.

The incidence of hepatitis B antigenemia was studied in 226 children with chronic hepatitis. A previous history of acute disease was recorded in 85.6% of the children (61.2% had an anicteric variant and 24.4% had an icteric variant). Chronic hepatitis occurred more frequently in children aged 3-7 yr. Hepatitis B antigen was observed in 51.8 ± 3.5% of the patients; the frequency of antigenemia was higher in the patients with active disease (63.6 ± 10.5%), than in the patients in remission (43.8 ± 3.8%). Remission was observed in 37.0 ± 5.2% of the patients with persistent antigen and in 59.0 ± 5.5% of those without persistent antigen. Persistent antigen was detected in 30% of the children with concomitant chronic diseases (28% entered the remission) and in 16% of the children without concomitant chronic diseases (58% were in remission).

4308 CONTROLLED TRIAL OF SYNTHETIC D-PENICILLAMINE AND PREDNISONE IN MAINTENANCE THERAPY FOR ACTIVE CHRONIC HEPATITIS. (Eng.) Stern, R. B.; Wilkinson, S. P.; Howorth, P. J. N.; Williams, R. (Middlesex Hosp., Mortimer St., London WC1, England). *Gut* 18(1):19-22; 1977.

The use of D-penicillamine in the treatment of active chronic hepatitis was evaluated in 35 patients, and its usefulness was compared with that of prednisone. Eighteen patients received D-penicillamine (increasing from 600 mg to 1.2 g/day), and 17 received prednisone (15 mg/day). In all patients, hepatitis had already been brought under biochemical control with corticosteroids. During the first yr of the trial, the treatment of nine patients in the D-penicillamine group was discontinued (2 because of lack of disease control and 7 because of side-effects) compared with six patients in the prednisone group (4 because of lack of disease control, 1 because of side-effects, and 1 because of the development of carcinomatosis). Detailed statistical analysis of the liver function tests in the patients remaining in the trial at the end of the year showed no significant differences. D-penicillamine is associated with a higher frequency of side-effects than is prednisone, and cannot be considered the treatment of choice in maintenance therapy for active chronic hepatitis. However, in some patients it is as satisfactory as prednisone in controlling the disease.

4309 LIVER CELL SURFACE LOCALIZATION OF HEPATITIS B ANTIGEN AND OF IMMUNOGLOBULINS IN ACUTE AND CHRONIC HEPATITIS AND IN LIVER CIRRHOSIS. (Eng.) Alberti, A.; Realdi, G.; Tremolada, F.; Spina, G. P. (Istituto di Medicina Clinica, Univ. Padua, Padua, Italy). *Clin. Exp. Immunol.* 25(3):396-402; 1976.

Results of immunofluorescence studies on liver cell-surface localization of hepatitis B surface antigen (HBsAg) and of IgG in acute hepatitis (18 patients) and chronic hepatitis or cirrhosis (27 patients) are reported. In acute hepatitis B, HBsAg was found at the surface of hepatocytes in the early phase of the disease (6 of 9 patients studied), but not during recovery. The number of positive cells ranged from 6 to 27%. A surface localization of IgG was found in two cases, both positive for HBsAg. In HBsAg-positive chronic hepatitis (10 patients) and cirrhosis, the antigen was found in the cytoplasm of hepatocytes, but not on the surface of the hepatocytes, while in HBsAg-negative cases (17 patients), the antigen could not be detected in the liver cells. IgG was detected at the surface of liver cells in seven of nine patients with chronic active hepatitis, in three of seven with cryptogenic cirrhosis, and in none with chronic persistent hepatitis or alcoholic cirrhosis. Of the 10 patients with IgG bound to the hepatocyte surface, 5 showed HBsAg in the serum as well as in the cytoplasm of the hepatocytes. A role of antibodies in the pathogenesis of the disease is suggested.

4310 THE SIGNIFICANCE OF HBAg AND THE IMMUNE REACTION IN CHRONIC HEPATITIS. (Fre.) Nicolaescu, T.; Bittman, E.; Bordeianu, A.; Boros, I.; Gheorghe, N.; Stoiculescu, P. (Institut de Physiologie, 11, bd 1 Mai, Bucharest, Rumania). *Sem. Hop. Paris* 53(4):235-240; 1977.

The significance of hepatitis B antigen (HBAg) and immune reactions in chronic hepatitis was studied in 496 patients with chronic persistent (206) or aggressive hepatitis (CAH: 93) or with inactive (IHC: 108) or active (AHC: 89) hepatic cirrhosis, and in 390 patients with other digestive diseases. Also included were 64 blood donors in whom HBAg was detected by immunodiffusion or counter immunoelectrophoresis. HBAg was detected in the patients by immunofluorescence after liver biopsy. Of the 496 patients, the antigen was detected in 34.2%, mostly in the CAH patients (53.7% compared to 23.2% of the IHC patients). It was found that 43/64 apparently healthy blood donors had had previous chronic liver diseases. A randomized study of 50 patients with CAH and 50 with AHC revealed that 63 were positive for HBAg and 37 were negative. Hepatic tests in both of these groups were essentially similar; however, histochemically, patients with positive tests had a much greater frequency of intense mesenchymal activity and hepatocytic necrotic dystrophy. Patients with serum HBAg also had HBAg in the nuclei of the liver parenchyma cells. The rise in immunoglobulin G levels was also greater in these patients. There were no differences in the two groups with respect to antinuclear, anticytoplasmic, or smooth muscle antibody levels or the results of immune reactivity tests.

4311 HISTOCOMPATIBILITY ANTIGENS IN CHRONIC LIVER DISEASE. (Eng.) Scott, B. B.; Rajah, S. M.; Losowsky, M. S. (St. James' Hosp., Leeds LS9 7TF, Yorkshire, England). *Gastroenterology* 72(1):122-125; 1977.

The frequencies of histocompatibility antigens (HL-A) were determined in 25 patients with chronic active hepatitis, 15 with cryptogenic cirrhosis, and 18 with alcoholic cirrhosis and compared with those in 900 healthy controls. The frequencies of HL-A1, 2, 3, 9, 10, 11, 28, 29, 1 + 8, 5, 7, 12, 13, 14, 17, and 27, and of W5, W10, W15, W18, and W22 did not differ significantly in patients and controls. HL-A8 was significantly increased among the patients with cryptogenic cirrhosis as compared with controls (53% versus 27%, $p<0.05$), although the difference became insignificant if corrected for the total number of antigens tested; the frequency of this antigen among the other two patient groups and controls was not significantly different. The fact that the frequency of HL-A8 was not higher in patients with chronic active hepatitis, a phenomenon that has been reported in previous studies, could not be explained by differences in liver histology, serum biochemistry, or serum immunology.

4312 PERIPHERAL BLOOD NEUTROPHILS REACTION TO HEPATIC ANTIGENS IN PATIENTS WITH CHRONIC LIVER DISEASE. (Rus.) Zolonitskaya, R. P.; Fradkin,

V. A. (Dept. Surgery, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (10):34-37; 1976.

4313 HISTOCOMPATIBILITY ANTIGENS IN HBsAg CARRIERS AND IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Petera, V.; Bufkova, D.; Kulich, V. (Dept. Medicine, Charles Univ., Plzn, Czechoslovakia). *Digestion* 14(5/6):539-540; 1976.

4314 THE INFLUENCE OF HLA-B8 AND B12 ON THE CLINICAL PRESENTATION AND COURSE IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Eddleston, A. L. W. F.; Galbraith, R. M.; Kennedy, L. A.; Batchelor, J. R.; Doniach, D.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):506; 1976.

4315 RELEASE OF LACTATE DEHYDROGENASE AS AN INDICATOR OF MEMBRANE HEPATOCYTE DAMAGE INDUCED BY LYMPHOCYTES FROM PATIENTS WITH CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Fernandez-Cruz, E.; Bootello, A.; Pascau, C.; Escartin, P.; Segovia de Arana, J. M. (Universidad Autonoma, Sch. Medicine, Madrid, Spain). *Digestion* 14(5/6):508-509; 1976.

4316 ACTIVITIES OF KREBS-HENSELEIT ENZYMES IN SUCCESSFULLY TREATED CHRONIC-ACTIVE HEPATITIS [Abstract]. (Eng.) Maier, K. P.; Talke, H.; Gerok, W. (Dept. Internal Medicine, Univ. Freiburg, Freiburg, W. Germany). *Digestion* 14(5/6):533; 1976.

4317 DIFFERENT SPECIFICITIES OF ANTIMITOCHONDRIAL ANTIBODIES IN SERA FROM PATIENTS WITH PBC AND CHRONIC ACTIVE HEPATITIS WITH CHOLESTASIS [Abstract]. (Eng.) Berg, P. A.; Lindner, H.; Breitsohl-Mork, C.; Merk, K. H.; Schlote, W. (Dept. Medicine, Univ. Tubingen, Tubingen, W. Germany). *Digestion* 14(5/6):457-458; 1976.

See also, 3956, 3961, 4250, 4253, 4291, 4292, 4303, 4331, 4333, 4334.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4318 MORPHOLOGY AND MORPHOGENESIS OF ALCOHOLIC LIVER CIRRHOSIS. (Rus.) Serov, V. V.; Labedev, S. P.; Mukhin, A. S. (First Moscow Medical Inst., Moscow, USSR). *Arkh. Patol.* 38(2):65-73; 1976.

The morphology and pathogenesis of alcoholic cirrhosis was observed in 42 liver biopsies from 32 patients of various ages. At least one biopsy was taken at laparoscopy from each patient, and repeat biopsies were realized by blind biospy. Cirrhosis was portal type in 26 patients, postnecrotic in 3, and mixed in 3. It is concluded that alcoholic cirrhosis is associated with multiple attacks of acute alcoholic hepatitis. After several episodes of alcoholic hepatitis, cirrhosis may change its morphological type from portal to postnecrotic or mixed type. In one patient, the first biopsy was diagnosed as portal cirrhosis; a biopsy repeat 2 yr later confirmed postnecrotic cirrhosis. Abstention from alcohol consumption resulted in stabilization of the histology and in disappearance of manifestations of exacerbation of cirrhosis. The study clarified the role of ethyl alcohol in progressive cirrhosis since every attack of acute alcoholic hepatitis was followed by postnecrotic-type liver pathology.

4319 DYNAMICS OF MORPHOLOGICAL CHANGES IN THE LIVER IN CHRONIC ALCOHOLISM. (Rus.) Serov, V. V.; Lebedev, S. P.; Mukhin, A. S. (First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 48(9):42-48; 1976.

Progressive stages of alcoholic lesion of the liver were studied in 140 patients with chronic alcoholism undergoing repeated liver biopsies. The majority of the patients were subjected to 2-4 biopsies at 0.5- to 4-yr intervals. Alcoholic degeneration of the liver was observed in 76 biopsy specimens. Repeated biopsies performed in the patients who abstained from alcohol showed that fatty degeneration was reversible. Alcoholic hepatitis was detected in 60 biopsies; 17 of 41 biopsies with features of acute alcoholic hepatitis also showed liver degeneration. Transformation of acute alcoholic hepatitis into chronic hepatitis was observed in 19 biopsies; three patients with acute alcoholic hepatitis developed chronic persistent hepatitis. Recurrences of the acute alcoholic hepatitis in the patients who developed persistent hepatitis were found to cause cirrhosis (2 patients). Alcoholic cirrhosis was found in 45 biopsies: 34 patients had alcoholic portal cirrhosis, 7 had postnecrotic cirrhosis, and 4 had mixed cirrhosis. Recurrences of acute alcoholic hepatitis (13 patients) could transform portal cirrhosis into mixed and postnecrotic hepatitis (2 patients). Chronic aggressive hepatitis was detected in four patients.

4320 THE BIOCHEMISTRY AND PATHOLOGY OF ALCOHOLIC LIVER DAMAGE. (Ger.) Eisenburg, J. (Klinikum Grosshadern, Medizinische Klinik II der Universitat Munchen, W. Germany). *Naturwissenschaften* 63(12): 556-569; 1976.

The problem of alcohol (AL) abuse associated with liver cirrhosis, which is among the leading causes of morbidity and mortality in the population between the ages of 25-65 yr in the Western countries, is reviewed with particular emphasis on the biochemical mechanism of liver damage. According to light microscopy, three characteristic AL-induced diseases are distinguishable: fatty liver, toxic liver, and cirrhosis. The latter two forms usually occur after years of AL consumption. Early liver changes are characterized by an increase in the size of hepatocytes and hypertrophy of the smooth endoplasmic reticulum. Further AL-induced changes are found in the Golgi apparatus in which activity of galactosyltransferase is sharply increased. Changes in the mitochondria include increase in size, subdivision of the outer membrane with increased permeability, change in density, deformation of the cristae, and paracrystalline inclusions. The accumulation of fat, an early and characteristic morphological liver change induced by AL, is caused by inhibition of fatty metabolism. Macroscopically, the liver is enlarged in the early stages of cirrhosis, but it decreases during the later stages and assumes a hard consistency with a nodulated superficial appearance. Evidently, the *de novo* synthesis of fibrinogen also plays a major role during this stage of the disease. The later stages of alcoholism may be accompanied by hepatoma.

4321 INCREASE OF SERUM MONOMERIC AND DIMERIC IMMUNOGLOBULIN A LEVELS IN ALCOHOLIC CIRRHOSIS. (Fre.) Andre, F.; Andre, C. (Unite de Recherches de Physiopathologie digestif, INSERM U-45, Hopital Edouard-Herriot, Pavillon H, F 69374 Lyon Cedex 2, France). *Biol. Gastroenterol. (Paris)* 9(2):147-150; 1976.

Monomeric and dimeric immunoglobulin A (IgA) concentrations were measured in 22 patients with alcoholic cirrhosis and 12 healthy volunteers (controls) by discontinuous sucrose gradient centrifugation and reduction alkylation. The patients had a statistically significant elevation in dimeric and monomeric IgA serum levels (7.28 and 2.41 times greater, resp.) compared with controls. A statistically significant elevation of IgM and IgG levels (by 1.84 and 1.56 times, resp.) was also detected in the patients. Double immunodiffusion showed that patient serum contained six times more IgA bound to the secretory component than control serum. Hypergammaglobulinemia A of alcoholic cirrhosis probably originates in the mucosa, since the increase in serum dimeric IgA is so much higher than that of the other immunoglobulins. Consequently, changes in the intestinal epithelium in cirrhosis undoubtedly are responsible for a deficit in the intestinal barrier, leading to the absorption of different antigens and inducing an immunological response.

4322 A STUDY ON MALLORY BODIES: ISOLATION, ULTRASTRUCTURE AND PRELIMINARY BIOCHEMICAL CHARACTERIZATION OF MALLORY BODIES FROM LIVERS OF ALCOHOLIC CIRRHOSIS AND MALIGNANT HEPATOMA. (Eng.) Okamura, K. (Tenri Hosp., Tenri, Nara 632, Japan). *Acta Pathol. Jpn.* 26(6):649-670; 1976.

Mallory bodies (MBs) were isolated from the livers of eight alcoholic patients and from a malignant hepatoma from a nonalcoholic patient using an improved centrifugal method (60% sucrose, 20,000 x *g* for 30 min) to investigate their mechanism of production. MBs were isolated in large quantity (100 mg-1 g wet pellet/1,000 g liver) and high purity (50 to 95%). The isolates were devoid of liver cell organelles except in the case of the malignant hepatoma where dense and membranous materia resembling nuclear substances and endoplasmic reticulum was found. The nuclear material had continuity with MBs. Electron microscopy suggested the presence of a dense body and very fine filaments within both *in situ* and isolated MBs in addition to the tubular structure of MB fibers The proportion of nonpolar amino acids in MB was small as compared with known fibrous proteins. MB protein solubilized in 6 M guanidine hydrochloride or 1% sodium dodecyl sulfate (SDS) with 2-mercaptoethanol and 8 M urea produced three peaks by Sephadex G-100 chromatography and at least five bands by SDS polyacrylamide gel electrophoresis. When examined spectrophotometrically, MB protein gave no absorption peak in the visual light range suggesting the absence of iron or copper. The results suggest that MBs are not newly synthesized protein but that protein components of MBs are similar to serum proteins and they are present in normal liver cells. It is suggested that MBs originate from nuclear material and serum proteins that are produced in the endoplasmic reticulum.

4323 LIVER FUNCTION IN CHRONIC ALCOHOLISM AND ITS CHANGES IN PROLONGED ABSTINENCE FROM ALCOHOL. (Rus.) Putalova, T. V. (Omsk Medical Inst., Omsk, USSR). *Klin. Med.* 54(10):81-85; 1976.

Chronic alcoholic men (105, aged 26-50 yr) were surveyed and divided into two groups: group 1 included 32 patients with stages I-II and II of alcoholism an group 2 included 73 men with stages II-III and III. Liver enlargement was observed in 33 patients; 16 patients complained of dyspepsia and pains in the right hypochondrium; and 13 complained of appetite loss, nausea, vomiting, and heartburn. The chronic alcoholic patients had significantly decreased albumin levels (44.04 ± 0.77% compared to 52.84 ± 1.38% in controls), elevated α_2-globulin levels (11.63 ± 0.25% compared to 8.71 ± 0.60% in controls) and β-globulins (14.61 ± 0.27% compared to 12.61 ± 0.59% i controls), reduced serum cholinesterase levels (128.0 ± 4.2% compared to 149.9 ± 5.3% in controls), and excessive BSP retention (6.57 ± 0.5% compared to 3.51 ± 0.01% in controls). Dysproteinemia was more pronounced in group 2 patients. Fifty-six patients underwent repeat examinations after 2 months of abstinence from alcohol, 36 after 6 months, and 35 after 1 yr. Dyspepsia and liver enlargement were found to undergo rapid regression, and at the end of the 1-yr follow-up, they were observed in only three patients. Nineteen patients showed complete normalization of liver function, 5 showed partial normalization, and functional disturbances of the liver were stable in 11 patients (all of them had 13- to 18 yr history of stage II-III chronic alcoholism).

4324 DUPUYTREN'S CONTRACTURE AND PALMAR ERYTHEMA IN ALCOHOLIC CIRRHOSIS. (Fre.) Bertrand, J.; Thomas, J.; Metman, E. H. (Chaire d'Hepatologie-Gastroenterologie, Faculte de Medecine, 2 bis, Blvd. Tonnelle, 37000 Tours, France). *Sem. Hop. Paris* 53(7):407-412; 1977.

The occurrence of Dupuytren's contracture and palmar erythema was compared in 100 patients with alcoholic cirrhosis (group I), 100 alcoholics without cirrhosis (group II), and 100 nonalcoholic, noncirrhotic controls (group III). Dupuytren's contracture was observed in 43% of group I, 34% of group II, and 14% of group III. Since there was no significant difference between groups I and II, the abnormality seemed more indicative of alcoholism than of liver disease. There appears to be a genetic component involved, but the clinical expression is facilitated by metabolic disorders, most frequently chronic alcoholism. Palmar erythema was present in 34% of group I, 23% of group II, and 12% of group III. It appears to be a manifestation of severe liver disease.

4325 ACUTE ALCOHOLIC HEPATITIS: DIAGNOSTIC CRITERIA, PROGNOSIS, AND TREATMENT. (Rus.) Mukhin, A. S.; Selindyeva, M. S.; Vinogradova, L. G.; Lebedev, S. P. (First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 48(9):30-42; 1976.

Of 150 patients with alcoholic lesions of the liver and 40 patients with chronic alcoholism followed up for 10 yr, 30 patients had acute alcoholic hepatitis (AAH). The average duration of alcoholism was 15 yr. Chief diagnostic manifestations of AAH were pain and dyspeptic syndromes, enlargement of the liver, elevation of the bilirubin level (up to 2 mg%), and increased activity of aminotransferases; two-thirds of the patients had nephropathy. Morphological examination of the liver specimens obtained at puncture biopsy showed necrosis of the hepatocytes, presence of Mallory bodies, and polynuclear infiltration of the portal stroma. Three clinical forms of AAH could be recognized: 10% of the patients had the latent form; the majority of patients had the icteric form; and 20% of the patients had the cholestatic form. Differential diagnosis between the latent form and fatty cirrhotic liver, and between the icteric and cholestatic forms and acute or viral hepatitis, could be arrived at only with liver biopsy.

4326 CLASSIFICATION OF ALCOHOLIC LIVER DISEASE: A MULTIDISCIPLINARY APPROACH [Abstract]. (Eng.) Hamlyn, A.; Lesna, M.; Watson, A. J. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Digestion* 14(5/6):517; 1976.

4327 IgA PATTERN IN LIVER TISSUE AS A DIAGNOSTIC TOOL IN ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Kater, L.; Jobsis, A. C.; Vogten, A. J. M.; Grijm, R.; Baart de la Faille-Kuyper, E. H. (Univ. Hosp. Utrecht, Utrecht, Netherlands). *Digestion* 14(5/6):526; 1976.

4328 CHRONIC ALCOHOLISM AND LIVER CIRRHOSIS. (Rus.) Mansurov, Kh. Kh. (Inst. Gastroenterology, Tadzhik, SSR, USSR). *Klin. Med. (Mosk.)* 54(7):10-16; 1976.

See also, 3743, 4243, 4253, 4269, 4411.

LIVER AND BILIARY TRACT

Cirrhosis

4329 NEUROPATHY IN HEPATIC DISORDERS. (Eng.) Chari, V. R.; Katiyar, B. C.; Rastogi, B. L.; Bhattacharya, S. K. (Dept. Medicine, Banaras Hindu Univ., Varanasi, 221005, India). *J. Neurol. Sci.* 31(1):93-111; 1977.

Clinical, electrophysiological, and histological techniques were used to investigate the possibility of neuropathy in 30 patients with liver cirrhosis liver and in 12 patients with infective hepatitis. The results were compared to those obtained from 13 healthy individuals. Other possible conditions in which neural damage might occur such as old age, diabetes, and chronic alcoholism were excluded through screening. Clinical evidence of neuropathy was observed in 63.3% of the patients with cirrhosis of the liver, abnormal conduction velocities were found in 33.3%, and histopathological evidence of segmental demyelination and regeneration were observed in 80%. Only 16.6% of the patients with hepatitis showed clinvelocities were found in 41.6% and histopathological studies revealed segmental demyelination and regeneration in 75% of the patients. In patients with liver cirrhosis, neuropathy was found to affect the lower limbs most frequently. This study shows that neuropathy can occur in both chronic and acute hepatic disorders. Therefore, the cause may not be purely metabolic in origin, as previously thought.

4330 QUANTITATIVE HISTOLOGICAL ASPECTS OF LIVER CIRRHOSIS. (Eng.) Morselt, A. F.; Freni, S. C.; Ortlep, F. M. (Histological Lab., Jan Swammerdam Instituut, le Constantijn Huygensstraat 20, Amsterdam-Oud West, Netherlands). *Beitr. Pathol.* 159(2):195-206; 1976.

Data obtained with Feulgen DNA-cytophotometry of individual parenchymal cell nuclei of cirrhotic livers are described in combination with a topographic study of the distribution of polyploid nuclei. A large number of nuclei with very thin, peripheral, and finely meshed chromatin and large nucleoli were seen in cirrhotic livers, but no mitosis was seen. Nuclei considered to be in the S phase were more frequent in cirrhotic human livers (5 patients) than in livers from normal individuals (5 patients). Large quantitative differences in the percentages of diploid, tetraploid (up to 40%), and octoploid nuclei (20%) were found between different nodules of the cirrhotic livers. The lowest percentage of diploid nuclei occurring in normal liver (10 patients) was 80%, with 15-20% tetraploid nuclei. No more than four adjacent fields of view with increased degree of ploidy were found in normal livers, excluding livers containing much lipofuscin (10-20 adjacent fields). In the group with suspected liver disease and in the group with cirrhotic livers, up to 40 adjacent fields with an increased degree of ploidy could be found. The percentage of nodular mass varied from 10 to 100%, with an average of 30%. It is suggested that regeneration in a pathological liver specimen can be described on the basis of six or more adjacent fields of view with an increased ploidy.

4331 DIFFERENCES BETWEEN PLASMA AND SERUM COMPLEMENT IN PATIENTS WITH CHRONIC LIVER DISEASE. (Eng.) Inai, S.; Kitamura, H.; Fujita, T.; Kojima, J.; Nagaki, K. (Center for Adult Diseases, Higashinari-ku, Osaka 537, Japan). *Clin. Exp. Immunol.* 25(3):403-409; 1976.

Plasma and serum complement (CH50) was analyzed in 60 patients with chronic liver disease (chronic hepatitis, 23; cirrhosis, 30; and 7 with hepatic cancer) and in 19 healthy subjects. The serum and plasma were separated and the hemolytic activities of complement and its components were assayed and their protein concentrations determined. In addition, hepatitis B surface antigen (HBsAg) and antibody were assayed by the immune adherence hemagglutination method. Eight patients with cirrhosis or chronic hepatitis had very low serum CH50 but normal plasma CH50; the serum and plasma levels of the remaining patients were relatively normal. The complement profiles of the patients with abnormal sera presented markedly decreased C4 and C2 activities but normal C3T (C3-C9) activities. The results suggest that early-acting complement components had been nonspecifically activated in the eight patients with very low serum but normal plasma CH50 through the classical pathway, although the possibility exists that the C1 component in these patients was activated through unknown mechanisms during blood coagulation or by mechanisms independent of coagulation and inhibitible by EDTA. No difference was found between plasma and serum CH50 in patients with HBsAg.

4332 ANTIMITOCHONDRIAL ANTIBODIES IN CHRONIC LIVER DISEASES. (Rus.) Bondar, Z. A.; Speransky, A. I.; Podymova, S. D.; Nasonov, E. L. (I.M. Sechenov Medical Inst., Moscow, USSR). *Sov. Med.* (12):11-15; 1976.

The diagnostic importance of antimitochondrial antibodies (AMA) was studied in 100 patients with different chronic disorders of the liver (17, primary biliary cirrhosis [PBC]; 35, chronic active hepatitis [CAH]; 23, macro- and micronodular cirrhosis; 5, chronic persistent hepatitis [CPH]; 10, systemic lupus erythematosus; and 10, rheumatoid arthritis). Ten healthy donors served as controls. Each patient was investigated immunologically for antismooth muscle antibody, rheumatoid factor, and immunoglobulins G, A, and M. AMA, estimated by indirect immunofluorescence, were revealed in 15/17 patients with PBC, in 6/35 with CAH, and were absent in patients with other liver diseases, connective tissue disorders, and in the controls. In every patient with PBC, an increase in the levels of cholesterol, alkaline phosphatase, and bilirubin was noted. Hypergammaglobulinemia was more characteristic of CAH. No difference in the level of transaminases was noted. In every patient with CAH in whom AMA were found, symptoms of cholestasis were noted: i.e., an increase in cholesterol and alkaline phosphatase levels, though to a lesser degree than in PBC patients. The highest titer of AMA (1:640) was found in PBC patients and the lowest, in CAH patients. The titers of AMA did not depend upon the intensity of clinical, immunological, and biochemical findings, or upon the stage of PBC.

4333 DEMONSTRATION OF MITOCHONDRIAL ANTIBODIES IN SERA FROM PATIENTS WITH CHRONIC LIVER DISEASES REACTING WITH TWO DIFFERENT TYPES OF COMPLEMENT-FIXING ANTIGENS. (Eng.) Berg, P. A.; Binder, T. (Medizinische Universitatsklinik, Otfried-Muller-Strasse, D-74 Tubingen, W. Germany). *Minerva Gastroenterol.* 22(3):185-189; 1976.

Mitochondrial antibodies have been detected in three different types of diseases: primary biliary cirrhosis (PBC), chronic active hepatitis (CAH) or cryptogenetic cirrhosis, and in pseudolupus erythematosus (PLE), a syndrome resembling systemic lupus erythematosus and now known to be drug-induced. One hundred and thirty-seven mitochondrial antibody-positive sera were tested against PBC and PLE antigens. Out of 55 PLE sera, 54 reacted with the corresponding antigen, whereas none of the 71 sera from patients with chronic liver diseases showed any reaction with the PLE antigen. However, only 39 sera fixed complement exclusively with the PBC antigen; the other 32 had antibody that reacted equally well with the PBC and PLE antigen. All patients whose sera reacted exclusively with the PBC antigen or with the PLE antigen manifested the classical clinical, biochemical, and pathological features of PBC or PLE. The patients whose sera reacted with both antigens showed a "mixed" clinical picture of CAH and PBC. The close correlation of specific antibodies with defined clinical entities or syndromes may reflect the etiological differences among these diseases. The observation that these antibodies may disappear during remission and rise again at relapse implies that immune mechanisms play a pathogenic role and may determine the outcome of a disease.

4334 CLINICAL APPLICATIONS OF IN VITRO TESTS FOR CELL-MEDIATED IMMUNITY IN LIVER DISEASES. (Eng.) Paronetto, F.; Vernace, S. J.; Colombo, M. (Mount Sinai Sch. Medicine City Univ. New York, New York, NY 10029). *Minerva Gastroenterol.* 22(3):227-232; 1976.

Cell-mediated immunity is a determinant in the pathogenesis of acute and chronic forms of liver diseases. Several *in vitro* tests have been devised to monitor the function of different subpopulations of lymphocytes, since it has been recognized that these cells are the effector cells of cellular immune reactions. Skin tests and studies of T and B lymphocytes, migration inhibition, lymphocyte stimulation, and lymphocytotoxicity detect not only sensitization of lymphocytes, which might be of pathogenetic significance, but also may be the result of liver damage. Cytotoxogenicity of lymphocytes *in vitro* supports the hypothesis that lymphocytes play a major role in the pathogenesis of some acute and chronic forms of liver disease. Blocking factors might interfere with the immunological responses of the lymphocytes against the liver. It is not clear which technique is best suited for monitoring the alteration of cell-mediated immunity. Most likely, a combination of tests would give a more comprehensive picture of the immunological status of the patient. Though not easy to perform, these tests can be of value in the prediction of the clinical outcome of patients with liver diseases.

4335 CHANGES IN THE ACID-BASE BALANCE DUE TO TREATMENT CONSISTING OF EXTRACTION, CONCENTRATION AND REINFUSION OF ASCITIC LIQUID IN LIVER CIRRHOSIS. (Ita.) Novarini, A.; Guariglia, A.; Bruschi, G.; Borghi, L.; Canali, M.; Ghinelli, F.; *et al.* (Istituto di Semeiotica Medica, Universita di Parma, 43100 Parma, Italy). *Ateneo Parmense [Acta Biomed.]* 47(1):5-13; 1976.

Changes in the acid-base metabolism of nine patients with cirrhosis of the liver and ascites were studied by determining blood electrolytes and acid-base status (sodium, potassium, osmolarity, chloride), and urine (volume/min, sodium, potassium, pH, titratable acidity, NH^{4+}). The acid-base balance parameters (pH, pCO_2, H_2CO_3, HCO_3^-, HCO_3^-/H_2CO_3) were determined in arterial blood and in ascitic fluid and its reinfused concentrate. The determinations were made before, during, and after infusion of concentrated ascites fluid obtained by an extraction-concentration reinfusion procedure. The renal function, expressed by the glomerular filtration rate (GFR) and renal plasma flow (RPF), was determined only before and after the treatment. Before treatment, the acid-base balance parameters showed decreased pCO_2 (33.6 ± 3.5 mm Hg), which was attributed to hyperventilation. The renal function was decreased (GFR=72 ml/min; RPF=472 ml/min) without reaching the limits of renal insufficiency. All the other parameters were normal. The blood and acid-base parameters during treatment were not significantly different from those before. The pH of the reinfused concentrated ascitic fluid was alkaline (7.57 ± 0.004), and the pCO_2 was significantly decreased (20.7 ± 1.1 mm Hg). All parameters determined after the treatment were comparable to those found before. The results imply that the treatment did not determine any significant variations in the acid-base balance; a significant loss of CO_2 was noted in the concentrated ascitic fluid.

4336 OUTCOME OF CHRONIC CHOLECYSTITIS LESIONS OF THE LIVER (MECHANISMS OF DEVELOPMENT OF BILIARY CIRRHOSIS). (Rus.) Bluyger, A. F.; Maksimova, L. A.; Kartashova, O. Ya.; Briedis, L. P. (Hepatological Center, Ministry Health, Latvian SSR, USSR). *Ter. Arkh.* 48(9):20-24; 1976.

The results of follow-up examination of 20 patients (all women, age 33-65 yr) with primary biliary cirrhosis (PBC) due to chronic intrahepatic cholestasis and of 49 patients with extrahepatic cholestasis (20 men, 27 women, aged 26-70 yr) are presented. Thirty of the patients with extrahepatic cholestasis also had acute obstructive jaundice, and 19 had chronic mechanical blockade of the bile ducts, which caused secondary biliary cirrhosis (SBC). The patients with both destructive cholangitis and PBC showed reduced alanine aminotransferase activity, and elevated cholesterol and β-lipoprotein levels. The patients with SBC had more pronounced hypergammaglobulinemia and less pronounced hypercholesteremia and β-liporpoteinemia, which may be due to decompensation of liver function.

4337 PORTAL VENOUS AND SYSTEMIC ENDOTOXAEMIA IN PATIENTS WITHOUT LIVER DISEASE AND SYSTEMIC ENDOTOXAEMIA IN PATIENTS WITH CIRRHOSIS. (Eng.) Prytz, H.; Holst-Christensen, J.; Korner, B.; Liehr, H. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Scand. J. Gastroenterol.* 11(8):857-863; 1976.

Portal blood in man was investigated to determine whether it contains endotoxin and/or viable bacteria and whether the liver acts as a filter of these substances. In cirrhosis, the clinical significance of systemic endotoxemia for clinical and laboratory findings was also evaluated. By means of the *limulus* gelation test, portal venous blood from 21 patients without parenchymal liver disease and arterial blood from 21 patients without parenchymal liver disease and 31 patients with cirrhosis were examined for endotoxin. Portal venous endotoxemia was found in 9 of 21 samples and systemic endotoxemia was found in 2 of 21 samples from patients without liver disease. Systemic endotoxemia in cirrhosis occurred with a frequency of 15/31. No relation to gram-negative bacteremia was found. Higher levels of *Escherichia coli* O antibodies were found in endotoxin-positive than were found in endotoxin-negative patients with cirrhosis, which supports the view that the *limulus* gelation test specifically detects endotoxin. This suggests that endotoxin is a normal constituent of the portal venous blood in man. The normal human liver effectively clears endotoxin from portal venous blood. This effect is diminished in cirrhosis, probably due to decreased phagocytic function in the liver. The increased humoral immune response in cirrhosis may be related to spillover of endotoxin from the liver.

4338 A COMPARATIVE STUDY OF CIRRHOSIS WITH AND WITHOUT PRIMARY CANCER OF THE LIVER.

(Fre.) Gislon, J.; Barge, J.; Feldmann, G. (Unite de Recherches de Physiopathologie Hepatique, INSERM, Hopital Beaujon, F 92110 Clichy, France). *Arch. Fr. Mal. App. Dig.* 65(5):369-378; 1976.

A necropsy study of 266 patients who died of liver cirrhosis (LCi) over a 4-yr period revealed that 44 (42 men, 2 women) had primary liver cancer (LCa), whereas 222 (122 men, 100 women) did not. A histological study of the 42 men of the LCa group showed that in 41 (group I), the LCi was a macronodular type comprised of irregular nodules. This type was also seen in 87 men without primary LCa (group II). The patients with primary LCa had statistically lower liver weights than those with LCi alone. Of the group I patients, 19 had dissemination of the cancer, 40 had a hepatocarcinoma, and 1, a cholangiocarcinoma. Eight of the group II patients had portal thrombosis. Both groups showed the same clinical signs, except that group I patients had significant weight loss, pain in the right hypochondrium, and a statistically significant rise in alkaline phosphatase and ESR values. Otherwise, no etiological differences were noted between both groups. The 2-yr survival of group I patients was only 20%, compared with 51% for group II patients. The mean age of death was 63 and 55 yr for groups I and II patients, resp. Fatal infections were more predominant in the latter group, but fatal hypoglycemia was more frequent in group I patients. The findings suggest that primary cancer is a late complication of cirrhosis, and indicate that men, 60 yr of age and older, with macronodular cirrhosis should be closely monitored for the development of primary liver cancer.

4339 THE CIRRHOTIC PATIENT AND PORTACAVAL SHUNT IN 1977.

(Fre.) Huet, P. M.; Marleau, D.; Lavoie, P.; Tanguay, S.; Viallet, A. (Hopital Saint-Luc et Universite de Montreal, Canada). *Union Med. Can.* 106(5):644-648; 1977.

The prognostic value of the evaluation of the functional portal blood supply to the liver by indocyanine green extraction (IGE), alone or with arterialization of the portal vein (10 patients), was studied in 30 cirrhotic patients, 20 of whom had a therapeutic portacaval shunt. All patients had hemodynamic studies, and all presented severe portal hypertension. A great variation in the IGE was noted ranging from a minimum of 3.3% to a maximum of 43.8%. Of the 20 patients who only had a portacaval shunt, 19 were followed from 1-50 months. Seven patients developed hepatic encephalopathy, and they had preoperative IGE values above 20% (average, 33.7%). No encephalopathy was noted in 12 patients who had IGE's below 20%. Of nine patients who died, only one death was attributed to rapidly progressive hepatic insufficiency. Of the 10 patients in the arterialization group, 7 were followed from 12-50 months. No encephalopathy or hepatic insufficiency developed in this group of patients. Three patients had a low IGE and consequently a markedly diminished functional portal flow, whereas four patients had a mean IGE of 31.9%. The preliminary results suggest that tolerance of a portacaval shunt procedure is better in patients with markedly depressed functional portal blood flow and that patients with slightly decreased portal blood supply might benefit from arterialization of the portal vein.

4340 RESULTS OF PORTACAVAL SHUNT WITH ARTERIALIZATION OF THE LIVER.

(Ger.) Matzander, U. (Chirurgische Klinik des Friedrich-Ebert-Krankenhauses, Sachsenring 1, D-2350 Neumunster, W. Germany) *Langenbecks Arch. Chir.* 342:145-151; 1976.

Arterialization of the liver with a portacaval shunt was performed in 82 cirrhotic patients with portal hypertension. Arterialization was done via the vena umbilicalis. The mortality during the first 4 weeks after operation was 19%. Of 35 patients subjected to arterialization after their first varicial bleeding, 16 survived 5 yr, 12/16 for >6 yr, 4/12 for 7 yr, and 2/4 for 8 yr. The patients had a marked drop in ammonia level in the peripheral blood and in BSP retention. Most patients became wel enough to resume their occupations. Excellent results were also obtained in a 55-yr-old man who developed encephalopathy following portacaval anastomosis.

4341 ORAL CHOLATE TOLERANCE TEST--AN APPLICATION OF THE RADIOIMMUNOASSAY OF SERUM CHOLIC ACID [Abstract].

(Eng.) Matern, S.; Haag, M.; Gerok, W. (Medizinische Universitatsklinik, Freiburg im Breisgau, W. Germany). *Digestion* 14(5/6):534; 1976.

4342 KINETIC STUDIES OF THE ROSE BENGAL TRANSPORT IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Pirotte, J. (Hopital de Baviere, Liege, Belgium). *Digestion* 14(5/6):483-484; 1976.

4343 RECTAL ^{13}N-AMMONIA TEST (^{13}N-LIVER/HEART RATIO), HEPATIC SINUSOIDAL PRESSURE AND PREVAILING PORTAL FLOW DIRECTION IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Hazenberg, H. J. A.; Gips, C. H.; Beekhuis, H.; Kruizinga, K. (Univ. Hosp., Groningen, Netherlands). *Digestion* 14(5/6): 518; 1976.

4344 SERUM AND CSF MAGNESIUM LEVELS IN PATIENTS WITH INDIAN CHILDHOOD CIRRHOSIS. (Eng.) Sharma, A.; Dhatt, P. S.; Singh, H.; Gupta, H. L. (Medical Coll., Rohtak, Haryana, India). *Indian J. Med. Res.* 64(2):292-295; 1976.

4345 INTRACELLULAR ELECTROLYTE ABNORMALITIES IN CIRRHOSIS [Abstract]. (Eng.) Alam, A. N.; Poston, L.; Golindano, C. E.; Wilkinson, S. P.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):491-492; 1976.

4346 HIGH PROTEIN CIRRHOTIC ASCITES: A PREDICTABLE ACCOMPANIMENT OF DIURESIS [Abstract]. Hoefs, J. C. (Dept. Medicine, Univ. Southern California, Los Angeles, CA). *Clin. Res.* 25(2):152A; 1977.

4347 HEPATOMA IN CIRRHOSIS: INFLUENCE OF TYPE OF CIRRHOSIS, AGE, SEX, AND HBsAg STATUS [Abstract]. (Eng.) Krasner, N.; Johnson, P.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. Medical Sch., London, England). *Digestion* 14(5/6):528; 1976.

4348 CHRONIC HEPATIC ENCEPHALOPATHY. (Eng.) Maddrey, W. C.; Weber, F. L., Jr. (Johns Hopkins Hosp., 601 North Broadway, Baltimore, MD 21205). *Med. Clin. North Am.* 59(4):937-944; 1975.

4349 LATENT PORTASYSTEMIC ENCEPHALOPATHY [Abstract]. (Eng.) Schomerus, H.; Hamster, W. (Abteilung I, Medizinische Universitatsklinik, Tubingen, W. Germany). *Digestion* 14(5/6):548-549; 1976.

4350 CIRRHOTIC HYPERGLOBULINEMIA: INCREASED RATES OF IMMUNOGLOBULIN SYNTHESIS BY CIRCULATING LYMPHOID CELLS [Abstract]. (Eng.) Berger, S. R.; Bull, D. M. (Harvard Medical Sch., Boston, MA). *Clin. Res.* 24(5):627A; 1976.

4351 PYRIDOXINE DEFICIENCY IN CIRRHOSIS [Abstract]. (Eng.) Rossouw, J. E.; Labadarios, D.; Davis, M.; McConnell, J. B.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):544-545; 1976.

4352 VARICEAL BLEEDING: RESULTS OF THE PORTAL DECOMPRESSION APPROACH IN SURGERY OF PORTAL HYPERTENSION [Abstract]. (Eng.) Garrido, G.; Ruiz-Alonso, J.; Mir, J.; Carrasco, D.; Sarrion, J. V.; Berenguer, J. (La Fe Hosp., Valencia, Spain). *Digestion* 14(5/6):515; 1976.

See also, 3942, 3982, 4250, 4252, 4253, 4257, 4291, 4309, 4311, 4312, 4313, 4320.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

4353 RADIOLOGICAL AND SURGICAL COMPARISONS IN THE STUDY OF THE BILIARY TRACT. CHOLANGIOGRAPHY BY ONE-HOUR PERFUSION: PEROPERATIVE CHOLANGIOGRAPHY. (Fre.) Dayras, M.; Labrune, M.; Larrieu, H. (Service de Radiologie, Hopital Antoine-Beclere, 154 ave. de la Porte-de-Trivaux, F 92140 Clamart, France). *Ann. Radiol. (Paris)* 19(8):759-764; 1976.

Pre- and peroperative radiographs were compared in 85 cholecystectomized patients. All preoperative radiographs were made after a 1-hr i.v. perfusion of radiopaque material, and a radiomanometric technique was used peroperatively. Peroperative cholangiographs showed the bile ducts more clearly, especially the intrahepatic duct. In 50/85 cases the pre- and peroperative findings were in good agreement. Most discrepancies in the remaining 35 cases arose because the i.v. cholangiographs failed to demonstrate lithiasis of the common bile duct.

4354 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY USING A FINE NEEDLE. 84 CASES. (Fre.) Bory, R. M.; Dubreuil, A.; Trepo, C. (Hopital

Edouard-Herriot, Place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(10):829-832; 1977.

The results of transhepatic percutaneous cholangiography (TCP) in 84 patients (39 with obstructive jaundice and 45 with suspected nonjaundiced biliary disease) are reported. The use of a fine needle caused a minimum of trauma and hemorrhage; only one case required surgery for a hemoperitoneum. The bile ducts were clearly visible in 67% of cases, with 100% of dilated ducts and 48% of normal ducts rendered opaque. The procedure was well-tolerated, and no reactions to the contrast medium or infectious complications occurred. TCP is recommended when jaundice is present or when cholecystography or cholangiography fails to opacify the ducts. When a hemorrhagic risk is present, percutaneous transjugular cholangiography or retrograde perendoscopic cholangiography is recommended.

4355 EVALUATION OF CHOLERETIC ACTIVITY OF DIHYDROXYDIBUTYL ETHER.

(Eng.) Fici, F.; Camarri, E.; Galluzzi, F.; Bagnoli, M. (Istituto Lusofarmaco, Milan, Italy). *Curr. Ther. Res.* 20(6): 772-793; 1976.

Biliary excretion induced by single doses of dihydroxydibutyl ether (DHDE) was evaluated quantitatively and qualitatively in 14 hospitalized patients without hepatobiliary or renal diseases. A 35% solution of DHDE was administered by duodenal tube in single doses of 300 mg (4 patients), 450 mg (5), and 750 mg (5). All dose levels produced a significant ($p<0.01$) increase in biliary flow, with increases of 38.8%, 70.4%, and 67.0%, resp., at 40-50 min. All DHDE doses also produced a significant ($p<0.01$) increase in the output of all solid components of the bile. Biliary acid outputs rose, with maximum percent increases of 109.2%, 164.1%, and 181.2%, resp., for the three doses. Cholesterol and phospholipid excretion rose also, with individual maximum increases of 92.6%, 172.3%, and 174.7% for cholesterol and 110.5%, 219.9%, and 150.9% for phospholipids, resp., for the three doses. Bilirubin output exhibited similar increases: 100.6% 148.7%, and 144.5% for the three doses, resp. Peak excretion of all solid components occurred 40 min after the administration of the 300-mg dose, with output decreasing gradually thereafter, although never returning to the initial values. Peak excretion of solid components occurred at 50-60 min with the 450-mg dose, was followed by an early decrease, and was at all times significantly ($p<0.01$) higher than the basal values. With the 750-mg dose, the peak excretion of solid components occurred after 40 min, except for the biliary acid output; this peak was followed by a declining phase and then a second increasing phase. The effects of DHDE are not dose-dependent; the increase in the output of solid components that occurred when the dose was raised from 450 mg to 750 mg was not proportional to the significant ($p<0.01$) increase that occurred when the dose was raised from 300 mg to 450 mg. DHDE can be classed as a true choleretic.

4356 INVESTIGATIONS OF THE CHOLERETIC ACTION OF FEBUPROL ON HEALTHY TEST SUBJECTS

(Ger. Wolf, Chr.; Ritter, U.; Zschocke, R.; Weinert, W. (I. Medizinische Klinik der Medizinischen Hochschule Lubeck, Kronsdorfer Allee, D-2400, Lubeck, W. Germany *Munch. Med. Wochenschr.* 118(40):1285-1288; 1977.

The choleretic effect of Febuprol (FB, 3-butoxy-1-phenoxypropanol-2, 50-200 mg) was studied in 18 healthy volunteers with the Bartelheimer double balloon. On three different test days, each patient received 50, 100, or 200 mg of FB as an emulsion in distilled water intraduodenally. Six subjects acted as controls and were given distilled water only (placebo). FB induced a dose-dependent, statistically significant increase in total bile in comparison with placebo-treated subjects. An absolute increase of bile acids, total cholesterol, phospholipids, and total bilirubin was ascertained in the FB-treated group. The concentrations of these constituents were greater in subjects given the 100-mg dose. The lithogenic index in the FB-treated subjects showed no significant change.

4357 CIRCULATING TISSUE ANTIGENS. III. IDENTIFICATION AND CHARACTERIZATION OF ANTIGENS OF LIMITED AND WIDE BODY DISTRIBUTION IN HUMAN GALL BLADDER BILE. PRESENCE IN SERUM OF PATIENTS WITH ACUTE HEPATITIS.

(Eng.) Espinosa, E. (Dept. Pathology, Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Clin. Exp. Immunol.* 25(3):410-417; 1976.

Antigens specific to bile and antigens shared by bil and other tissues were investigated and characterized. Human gallbladder bile and liver, kidney, cardiac muscle, and skeletal muscle tissues were obtained a few hours after death from eight patients considered to be normal at autopsy. Pig, dog, cat, guinea pig, and Rhesus monkey biles were obtained shortly after sacrifice of the animals. Rabbit antisera to the bile and to saline extracts of the tissues were prepared. The bile samples, when tested with the antisera by double immunodiffusion, all shared antigens BT-1, BT-2, and BT-3, and half the samples shared an antigen designated BA that was unrelated to BT-1. Antigens BT-2 and BT-3 were unrelated to BT-1 or BA. Kidney was found to share BT-1, and liver was found to share BT-2 and BT-3, with all the bile samples. All four antigens separated from one another in immunoelectrophoresis and by Sephadex G-200 gel filtration, the order of elution from the column being BT-1, BT-3, BA, and BT-2. Lyophilized preparations of various tissues and body fluids were tested for their ability to abolish the precipitin lines in immunodiffusion experiments by absorbing the antibodies from the antisera. The results indicated that BT-1 is present in bile, kidney, and urine. BT-2 and BT-3 are mainly found in liver, kidney, lung, and bile. BA was found in half the bile samples and in the saliva of three of five normal subjects screened. Species specificity was studied by absorbing antisera with biles from variou mammals. Absorption with human bile abolished all antigen reactions, except when the absorbant was one of the samples in which BA did not occur. Absorptio with pig, dog, cat, and guinea pig biles did not alter any of the lines of precipitation. Only the BA reaction was abolished by absorption with Rhesus monkey bile. The sensitivity of the antigens to pronase, heating, and variations in pH were investigated. The sera of 33 patients and 48 normal blood donors were examined by double immunodiffusion for the presence of bile antigens. BT-1 and BA were not detected in any samples, BT-2 and BT-3 were detected in most patients with acute hepatitis, but not in any other subjects. The demonstration of cell-mediated immune response to a protein fraction of human bile from patients with primary biliary cirrhosis and chronic active hepatitis suggests that bile antigens may be related to autoimmune liver disease.

4358 RADIOLOGICAL DIAGNOSIS OF BOUVERET'S SYNDROME.

(Fre.) Felix, M.; Burelle, H.; Clement, J. P.; Devin, R. (Hopital Sainte-Marguerite, 270, Blvd. Sainte-Marguerite, F. 13274, Marseille, France). *J. Radiol. Electrol. Med. Nucl.* 58(4): 315-318; 1977.

The diagnosis and treatment of Bouveret's syndrome (a rare form of biliary fistula) in an 81-yr-old man are presented. Upon admission, the patient complained of slight hematemesis. X-ray examination revealed a gallstone obstructing the proximal duodenum. A barium gastroduodenal transit study showed a large, rounded, regular obstruction of the duodenal bulb surrounded by a fine circle of barium and occupying almost the entire duodenal bulb. Laparotomy disclosed multiple calculi in the gallbladder. A large stone (2.7 cm in diameter) was removed by means of a limited gastrostomy. Gastroduodenal transit studies provide the most diagnostic information for unusual biliary fistulas.

4359 THE CONTRIBUTION OF DUODENOSCOPY IN THE DIAGNOSIS OF TUMORS OF THE PAPILLA.

(Fre.) Cremer, M.; Hermanus, A.; Dony, A.; Deltenre, M.; Toussaint, J.; Govaerts, J. P.; Peeters, J. P. (No affiliation given). *Bordeaux Med.* 9(18):1433-1439; 1976.

Of a series of 19 papillary tumors, 17 were discovered by endoscopic cholangiowirsungography of 579 patients with obstructive icterus, while 2 were found out of a total of 4,972 duodenoscopies. Carcinoma of Vater's ampulla was present in 10 patients (average 71.3 yr; 8 men, 2 women), 9 of which had obstructive icterus. The bile duct and hepatic ducts were always dilated, and obstructive pancreatitis occurred in two cases. Local resections and reimplantation of the hepatic and pancreatic duct were performed in seven cases, and bilio-digestive derivations in three cases. Benign tumors were found in six patients (average 68.3 yr; 5 men, 1 woman); the symptoms of these tumors were similar but not as severe as with carcinomas, since the tumors were generally much smaller. Local resections were done in three cases and derivations in two cases. Endoscopy was diagnostic for tumors in all patients, but endoscopic biopsy was of minimal value in characterizing the tumors.

4360 A RARE FORM OF CARCINOMA OF THE COMMON BILE DUCT: PAPILLARY CARCINOMA

(Fre.) Malvy, P.; Le Neel, J. C.; Nomballais, M. F.; Le Borgne, J.; Visset, J. (U.E.R. de Medecine 1, rue Gaston Veil, 44035, Nantes, France). *J. Chir. (Paris)* 112(1/2):15-24; 1976.

Papillary carcinomas, which represent only 5% of all common bile duct carcinomas, were observed in four patients. Diagnosis was difficult, due to the long prodromal phase and the nonspecific symptoms, which included attacks of cholangitis, subclinical jaundice, and postprandial epigastric pains. Surgical intervention resulted almost always in the macroscopic diagnosis of the disease, which was confirmed microscopically. The papillary carcinomas had a villous appearance and consisted of fine coalescent fringes. Cellular abnormalities and atypical mitoses were frequent. Since the tumor evolves very slowly, even palliative surgery can result in long term survival. Radical resections are recommended for patients in good general health, since local recurrences are very high.

4361 THE CONTENT OF BILIARY CALCULI AND SOME POSSIBLE CAUSES OF THEIR FORMATION.

(Rus.) Mironenko, G. A.; Iurgenson, G. A. (Medical Inst. Chita, USSR). *Vestn. Khir.* 117(12):47-49; 1976.

A total of 135 biliary calculi from 120 operated patients were studied visually and with infrared spectrophotometry. Four groups of calculi were differentiated according to their biochemical content: G1, cholesterol containing less than 1% of metal and phosphorus; G2, metalocholesterol containing 20-30% magnesium and calcium; G3, cholesterolphosphatide with high concentrations (ranging from 2-5%) of metals, especially calcium, magnesium, sodium, and phosphorus; and G4, phosphatide-protein with high concentrations of iron, sodium, manganese, calcium, magnesium, copper, and unusually high concentration of nitrogen (5.52%). Interaction between metallic elements in the formation of biliary calculi was revealed by correlative analysis. Two biochemical processes leading to calculi formation are suggested. The precipitation of cholesterol from the bile and blood may be explained by interaction between aluminum and iron resulting in substitution of Fe^{+++} for Al^{+++}. A second possible mechanism is a disturbance of the metabolism of phosphorus and sodium, as related to the increase of phosphorus concentration in the blood serum of patients with cholelithiasis.

4362 EXAMINATION OF THE SURFACE OF GALLSTONES AND THE FRACTURED CROSS SECTIONS BY INCIDENT LIGHT MICROSCOPY AND SCANNING ELECTRON MICROSCOPY.

(Ger.) Cesnik, H.; Mitsche, R.; Strunz, K. (Chirurgische Abteilung des Landeskrankenhauses Leoben, A-8700 Leoben, Austria). *Langenbecks Arch. Chir.* 343(2):153-160; 1977.

The surfaces and fractured cross sections of gallstones were examined by incident light microscopy (ILM), scanning electron microscopy (SEM), elemental microanalysis (EM), and x-ray crystallography (XRC). ILM revealed five types of gallstones consisting of three basic structural layers: a central nucleus, a radially structured middle layer, and a fine crystalline outer shell. The presence or absence of the latter two layers differentiates the five types. Basically, flat and globular types were demonstrated by SEM. The globular element always belonged to the nucleus; the flat, crystalline element to the outer layers. EM revealed calcium in the nucleus, radial structure, and inner layers but not in the outer white layers. Iodine could also be detected in certain stones. White crystal formation was apparent at sites of fracture. XRC showed that the outer layer and transcrystalline inner layer were identical and appeared to be made up of pure cholesterol. Changes in the structure of gallstones are most likely due to a physical or chemical condition during their development.

4363 BILE ACID ALTERATIONS IN PATIENTS WITH CHOLESTEROL GALLSTONES. (Eng.) McDougall, R. M.; Walker, K.; Thurston, O. G. (Univ. Alberta Hosp., Edmonton, Alberta, Canada T6G 2G3). *J. Surg. Res.* 21(4):233-237; 1976.

The proportions of individual bile acids in gallbladder bile were studied in eight patients with cholesterol gallstones and in six controls undergoing laparotomy for other upper abdominal conditions. The gallstone patients all had functioning gallbladders. The eight patients had bile supersaturated with cholesterol, while the control subjects had unsaturated bile. The proportion of deoxycholic acid (DCA) in the bile acid pool was significantly higher in the gallstone patients in comparison with controls (gallstone mean=30% ± 3.9%, control mean= 18 ± 2.5%, $p<0.05$). The proportions of cholic acid and chenodeoxycholic acid in gallstone patients and controls were not significantly different, although a possible trend was observed with cholic acid, where the mean was lower in the gallstone patients. Since DCA is formed in the colon by bacterial action on cholic acid, the results suggest that the colonic phase of the enterohepatic circulation is altered in patients with cholesterol gallstones.

4364 THE TREATMENT OF GALLSTONES WITH CHENODEOXYCHOLIC ACID. (Fre.) Dhumeaux, D.; Metreau, J. M. (Service d'Hepato-gastroenterologie et Unite de Recherches INSERM U-99, Hopital Henri-Mondor, F94010 Creteil, France). *Rev. Medecine* 17(31):1641-1648; 1976.

The most common form of cholelithiasis is caused by an excessive secretion of cholesterol, causing an imbalance in the ratio of cholesterol:bile salts: phospholipids in the bile. This excess cholesterol cannot be maintained in solution and is precipitated as gallstones. The prolonged oral administration of 15 mg/kg/day of chenodeoxycholic acid can reduce the cholesterol content of bile and dissolve calculi over a period of 6 months to 2 yr in 40-65% of cases. The calculi must be radiotranslucent and the gallbladder functional for the treatment to succeed. A low-dose, intermittent maintenance program should be helpful in preventing recurrences. Hepatic toxicity of the drug appears to be low, but long term effects cannot be excluded. It is suggested that treatment with chenodeoxycholic acid be limited to those patients who refuse surgery or are high surgical risks.

4365 THERAPEUTIC EFFECT OF THE CHOLAGOGUE UROCHOLESANE IN CHRONIC CHOLECYSTITIS PATIENTS. (Rus.) Nemialkovskii, I. B. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (12):76-78; 1976.

The effect of the cholagogue, urocholesane (UCS) on the clinical and metabolic function of the liver and biochemical analysis of the bile was studied in 25 patients with chronic cholecystitis. They received UCS (exact dosage not given) before meals together with a controlled diet, antihistamines, and vitamins. The results were compared with 38 untreated patients (control group). In general, side-effects were absent or minor (mouth odors). In most patients, UCS significantly decreased the pain, which was completely eliminated in five patients. The intake of UCS for 15-18 days had a favorable influence on intestinal and biliary diarrhea. In 15/25 patients, the activity of the intestine was normalized. UCS had a positive effect on the biochemical structure of both B and C bile portions. No difference in the quantity of the bile secreted by the liver was found, but fatty acid concentrations were increased (B portion from 1691.5 ± 337.2 to 2,903.0 ± 471.3 mg%, p=5%; C-portion from 518.5 ± 221.5 to 1,697.0 ± 507 mg%, p<5%). No large difference in the concentration of cholesterol was noted. Bilirubin in the C-portion of bile was increased twofold of the initial value of 1.68 ± 0.38 mg%. The results suggest that UCS significantly decreases lithogenesis of the bile and increases its colloidal stability. Use of UCS for chronic cholecystitis or gallstone disease, and other chronic diseases of the liver characterized by secretory liver deficiency and intracellular cholestasis is recommended since UCS does not increase the amount of the bile, it should be given together with hydrocholeretics.

4366 EXTRAHEPATIC BILIARY LITHIASIS IN CHILDREN. RESULTS OF A MULTICENTER INQUIRY (100 CASES). (Fre.) Fortier-Beaulieu, M.; Battin, J.; Auzerie, J.; Mage, K. (Service de Radio-Pediatrie, Hopital Herold, 7, place Rhin-et-Danube, F 75935, Paris Cedex 19, France). *Ann. Radiol. (Paris)* 19(5): 487-493; 1976.

The results of a multicenter inquiry on 100 childhood cases of biliary lithiasis (BL) are reported. The most frequent symptoms were abdominal pain, vomiting, icteric episodes, and diarrhea. BL was discovered by simple radiology of the abdomen (40), urography (11), p.o. or i.v. cholecystography (25),

ɔperation (14) or postoperative cholangiography
, and other various procedures (8). According
the diagnostic modality, the calculi were located
the secondary bile duct in 92 patients and in the
n bile duct in 19. The etiology of BL could be
ced in one-half of the cases: 24 patients had
ɔlytic anemias, 5 hepatic pathologies, 1 a cal-
ied bile syndrome, 11 malformations of the bile
ts, 5 an ileal resection, and 4 had BL and intes-
al pathology. Treatment of BL is essentially
gical. Therapy with triglycerides and chole-
ramine is recommended postoperatively.

7 DIAGNOSTIC TRAPS AND MANAGEMENT OF RADIO-INVISIBLE BILIARY LITHIASIS. (Fre.)

an, L.; Cherif-Zahar, K.; Lepage, B.; Bories-
au, A. (Service de Chirurgie D, Clinique Saint-
:les, 34059 Montpellier, France). *J. Chir.*
ris) 111(4):431-442; 1977.

iical and biological parameters leading to a de-
ion to surgically treat biliary microlithiasis
e., radio-invisible biliary lithiasis) are re-
wed, and four case histories of cholecystecto-
ed patients with misleading initial findings
g., normal transvesicular bilography, cholangio-
phy-tomography, and the absence of arterial or
cification anomalies) are presented. Symptoma-
ogy associated with acute pancreatitis, hepatic
ic, acute papillary obstruction, transitory ob-
uction of the vesicular infundibulum, and chole-
tic, pancreatic, and duodenal duct syndrome
considered. Situations requiring exploration
the major bile duct (e.g., where the presence
calculi is uncertain) with respect to probable
dings, radiomanometry, and direct examination
presented. Preference for the term radio-
isible biliary lithiasis (i.e., biliary micro-
iiasis) is expressed, since the parameters are
itical, but the former is more reflective of
diagnostic difficulties involved. It is rec-
ended that medically screened patients with
urrent pancreatitis be subjected to surgical bil-
y exploration, and in cases of perceptible lithi-
s or where the gallbladder bile contains mud,
ris, sand, or cholesterol spheroids, that chole-
tectomy be performed.

3 ON THE MECHANISM OF PRODUCTION OF THE "PORCELAIN GALLBLADDER." (Rum.)

Brinzeu,
Georgescu, L.; Mocanu, N.; Mogoscanu, M. (Clin-
I chirurgie, Timisoara, Rumania). *Chirurgia*
charest) 25(3):183-187; 1976.

culous cholecystitis with hydrops of the gall-
dder was diagnosed in a 50-yr-old woman who had
an acute biliary colic 12 yr earlier. Radio-
phy showed the typical picture of porcelain
lbladder. The histological examination of the
irpated gallbladder revealed three local patho-
etic factors that led to porcelain gallbladder:
onic entrapment of a stone in the bladder neck
h obliteration of the cystic duct, chronic in-
mmation of the wall of the gallblader, and
hemia of the entire gallbladder due to oblitera-
tion of the cystic artery. The coincidence of these three factors in the same patient is exceptional, which explains the rarity of this complication of cholelithiasis.

4369 A CONTROLLED STUDY OF THE ACTION OF PINAVERIUM BROMIDE ON BILIARY DYSKINESIS.

(Fre.) Darnis, F. (Hopital Saint-Antoine, 75012 Paris, France). *Ann. Gastroenterol. Hepatol.* 13(2): 177-184; 1977.

A biphasic analysis of the effect of Pinavarium bromide on two groups of patients with biliary dyskinesis (BD) is presented. Group I was comprised of 2 men and 18 women (mean age, 46 ± 15 yr). Group II was comprised of 5 men and 15 women (mean age, 48 ± 12 yr). Patients with malignant digestive disease and non-BD related pain were excluded from the study. Pinaverium bromide, 50 mg, was given 0.5 hr before meals (150 mg/day) in the form of red (phase I) or blue (phase II) capsules. In phase I, group I patients were given active substance; group II patients were given placebo for 7 days (or if inefficacious, discontinued after 4 days and started on phase II). In phase II, both group I and group II were given active substance for 7 days. The parameters of therapeutic activity were: abdominal pain (spontaneous or provoked), migrain, nausea, vomiting, diarrhea, constipation, and dyspepsia. Results were judged good if abdominal pain and related symptomatology disappeared, moderate if abdominal pain diminished and related symptomatology was ameliorated, and null if pain and symptomatology persisted. Treatment was judged ineffective after 4 or 7 days in 7 patients on active substance, and 15 patients on placebo. Indices of medicine tolerance were: cardiac frequency; arterial pressure, and anticholinergic symptomatology. The active substance was more effective than placebo ($p<.05$), and early discontinuence of treatment was higher in the placebo group ($p<.02$). Clinical tolerance of the drug was good and no anticholinergic side-effect was noted.

4370 THE SO-CALLED "WHITE BILE:" A CLINICAL-EXPERIMENTAL INVESTIGATION. (Rus.)

Makokha, N. S.; Zykov, Iu. A.; Budanov, V. A.; Jazik, S. I. (Omsk Medical Inst., Omsk, USSR). *Vestn. Khir.* 116(8):22-24; 1976.

The characteristics of the so-called "white bile," observed in obstructive jaundice of various etiologies are described based on 37 clinical cases and experimental findings in 20 dogs. From 1965 to 1974, 205 operations for extrahepatic obstruction were carried out, and "white bile" was found in 37 patients (19 men, and 18 women). In 35 patients, the "white bile" was was viscous and slightly opalescent; in 2 patients it was a greenish liquid with flakes of fibrin. Differences in "white bile," related to the duration of obstructive jaundice, were not found. In the experimental study in 20 dogs, obstructive jaundice was provoked by ligation and incision of the common bile duct. In nine dogs, autopsy revealed transparent, viscous, slightly opalescent fluid in the gallbladder and hepatic ducts (dogs were killed 14, 18, 30, and 40 days after ligation). In another series of experiments, a fistula was applied to 11 dogs, and the gallbladder was excluded from digestion by ligation of the cystic duct. In 7/11 dogs the common bile duct was ligated in addition. In three dogs of this series, viscous, slightly opalescent fluid was secreted for 1.5-2 months; in one dog, the secretion was discharged for 6 months. The amount of secretion depended on the weight of dogs and fluctuated from 2 to 10 ml/24 hr. On the first day after surgery, secretion was colored by bile; on the 3-5th day, bile became transparent, viscous, and opalescent. It was concluded that "white bile" is a colorless secretion of bile ducts and gallbladder mucous membrane found more often in complete obstruction of the extrahepatic bile ducts when duration of the jaundice is not less than 10-14 days.

4371 MALACOPLASIA OF THE CYSTIC DUCT. (Fre.) Sahel, J.; Scheiner, C.; Lebreuil, G.; Sarles, H. (Hopital Sainte-Marguerite, F 13009 Marseille, France). *Arch. Fr. Mal. App. Dig.* 65(8): 585-590; 1976.

A rare case of malacoplasia of the cystic duct occurred in a 7.5-yr-old boy. The patient had repeated painful biliary crises accompanied by fever and eosinophilia. A parasitic infection was suspected, since the patient had recently resided in North Africa, but this could never be demonstrated. He was treated medically for 3 yr with only partial and transitory success. Cholangiographic studies showed a normal common bile duct, but the gallbladder could not be opacified. Surgical intervention showed a histiocytic cholecystitis without lithiasis and a villous papilloma that obstructed the cystic duct. After cholecystectomy, the patient recovered fully and the eosinophilia gradually disappeared.

4372 HEAT-REGULATING AND FIBRINOLYTIC PROPERTIES OF THE GALLBLADDER. (Rus.) Skipetrov, V. P.; Viakina, I. G.; Kargaeva, V. G. (Mordovian Univ. Sch. Medicine, Saransk, USSR). *Vrach. Delo* (9):97-99; 1976.

4373 A SOLUTION FOR PRESERVATION OF THE LIVER. (Rus.) Margulis, M. S.; Krivulis, D. B.; Rozental, R. L.; Sorokin, Ju. A. (Lab. Experimental Surgery, Riga Medical Inst., Riga, USSR). *Vestn. Khir.* 117(10):32-35; 1976.

4374 DISEASES OF THE BILIARY DUCTS. (Eng.) Larsen, C. R.; Scholz, F. J.; Wise, R. E. (605 Commonwealth Ave., Boston, MA 02215). *Semin. Roentgenol.* 11(4):259-267; 1976.

4375 CHOLESTEROL CRYSTALS: THEIR CURRENT DIAGNOSTIC VALUE IN DISEASES OF THE BILIARY DUCTS. (Spa.) Alberdi Frias, J. M.; Cobo de la Cruz, J.; Perez Mota, A.; Campomanes Gallego, E.; Perez Munoz, C. (Servicio-Escuela de Enfermedades Digestivas del I.N.P. Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(3):319-326; 1976.

4376 CANCER OF THE EXTRAHEPATIC BILE DUCTS. (Rus.) Shabanov, A. N.; Dmitriev, A. E.; Tatevosyan, A. S.; Musalatov, K. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Khir.* 117(10):36-40; 1976.

4377 FUNCTIONAL-MORPHOLOGICAL STATE OF THE LIVER IN SECONDARY CHOLANGITIS. (Rus.) Shulutko, B. I.; Burmistrov, M. I.; Shlimovich, P. B.; Zus, B. A.; Miroshnichenko, A. G. (Dept. Surgery, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Vestn. Khir.* 117(10):27-30; 1976.

4378 ACTIVITY OF SOME ENZYMES OF THE BLOOD SERUM AND INDIVIDUAL ORGANS IN ACUTE CHOLECYSTITIS. (Rus.) Kryzhanovskaya, I. I.; Bondarenko, N. M.; Erkes, E. L. (Dept. Therapy, Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Vrach. Delo* (8):1-6; 1976.

4379 THE RADIOLOGIC DIAGNOSIS OF ACUTE CHOLECYSTITIS. (Eng.) Weens, H. S.; Clements, J. L., Jr. (Grady Memorial Hosp., 80 Butler St., S.E., Atlanta, GA 30303). *Semin. Roentgenol.* 11(4): 245-247; 1976.

4380 FUNCTIONAL-MORPHOLOGICAL CHANGES IN THE UPPER SECTORS OF THE ALIMENTARY TRACT IN CALCULOUS CHOLECYSTITIS. (Rus.) Grebenev, A. L.; Rafidzhanova, S.; Vodolagin, V. D.; Tsodikov, G. V.; Brodskaya, A. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (10):131-135; 1976.

4381 SURGICAL APPROACH TO OBSTRUCTIVE JAUNDICE CAUSED BY CHOLEDOCHOLITHIASIS. (Rus.) Antonov, M. I.; Begachev, V. B.; Kurenkova, L. V.; Ashraf, Iu. M. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (12):63-65; 1976.

4382 ON THE ACTIVITY OF REPARATIVE PROCESSES IN THE LIVER IN CHOLELITHIASIS. (Rus.) Vandan, Ya. A.; Kartashova, O. Ya.; Zaltsmane, V. K.; Maiore, A. Ya.; Mutsenieks, P. P.; Yanson, A. Ya. (Hepatological Center, Ministry of Public Health, Latvian SSR, Riga, USSR). *Vestn. Khir.* 117(10):24-27; 1976.

4383 USE OF THE ^{131}I ROSE BENGAL TEST IN CHOLESTATIC JAUNDICE. (Fre.) Dubarry, B. (Universite de Bordeaux, Bordeaux, France). *Rev. Fr. Gastroenterol.* (121):51-54; 1976.

4384 ETIOLOGIC DIAGNOSIS OF CHOLESTATIC JAUNDICE BY MINI-LAPAROTOMY. (Fre.) Salembier, Y. (69, rue de la Louviere, F 59000 Lille, France). *Nouv. Presse Med.* 5(31):1995-1996; 1976.

4385 THE PREVALENCE OF GALLBLADDER DISEASE IN PATIENTS WITH ILEOSTOMY. (Eng.) Jones, M. R.; Gregory, D.; Evans, K. T.; Rhodes, J. (Welsh Natl. Sch. Medicine, Cardiff, Wales). *Clin. Radiol.* 27(4): 561-562; 1976.

4386 GRAM STAIN ON BILE ASPIRATED AT OPERATION: A RATIONAL APPROACH TO ANTIBIOTIC THERAPY IN BILIARY DISEASE [Abstract]. (Eng.) Keighley, M. R.; Crapp, A. R.; Burdon, D. W.; Slaney, G.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Eur. Surg. Res.* 8(Suppl. 1):22-23; 1976.

4387 ROENTGENOLOGICAL EXAMINATION OF THE EXTRAHEPATIC BILE DUCTS IN PATIENTS WITH SUPRADUODENAL CHOLEDOCHODUODENAL ANASTOMOSIS. (Rus.) Filimonov, M. I.; Zgonnik, T. D. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (12):65-68; 1976.

See also, 3757, 3765, 3941, 3943, 3944, 3945, 3948, 3949, 3950, 3951, 3953, 3954, 3955, 3957, 3962, 3963, 3966, 3967, 3968, 3970, 3973, 3974, 4010, 4011, 4012, 4013, 4014, 4015, 4016, 4017, 4018, 4082, 4250, 4271, 4336, 4386, 4475.

GENERAL

4388 BACTEREMIA AFTER UPPER GASTROINTESTINAL ENDOSCOPY. (Eng.) Baltch, A. L.; Buhac, I.; Agrawal, A.; O'Connor, P.; Bram, M.; Malatino, E. (Veterans Admin. Hosp., 113 Holland Ave., Albany, NY 12208). *Arch. Intern. Med.* 137(5):594-597; 1977.

The occurrence, persistence, and possible significance of bacteremia associated with upper gastrointestinal endoscopy were determined, and two commonly used bacteriologic blood culture media were compared in the detection of bacteremia in these patients. During 24 months, 200 upper gastrointestinal endoscopies were performed on 193 patients. Blood cultures were obtained before and 5 and 30 min after the procedure using thiol (50 ml) and trypticase soy broth (100 ml) media. The mean endoscopic time was 34 min. Sixteen patients developed bacteremia (8%). Twelve groups of microorganisms were detected in positive blood cultures: *Streptococcus* (5 species), *Lactobacillus* sp., *Veillonella alcalescens*, *Staphylococcus aureus*, *S. epidermis*, *Propionibacterium acnes*, *Corynebacterium acnes*, and *Bacillus subtilis*. Seven patients had positive blood cultures at 5 and 30 min, eight at 5 min, and one at 30 min only. There was no clear correlation of bacteremia with the age or previous history of the patient, biopsy, active bleeding, endoscopic time, or findings. A follow-up study of all patients for 6 months to 2 yr indicated no complications related to endoscopy and/or bacteremia.

4389 ARTICULAR MANIFESTATIONS OF CARCINOID TUMORS OF THE DIGESTIVE TRACT. (Fre.) Solnica, J. (Hotel-Dieu, F 76038 Rouen Cedex, France). *Rev. Rhum.* 43(10):591-594; 1976.

The rare occurrence of joint manifestations of carcinoid tumors (CT) of the digestive tract are reviewed. These manifestations resemble rheumatic disease and include morning stiffness, joint inflammation, elevated erythrocyte sedimentation rate, and hyperuricemia. X-ray examination has also revealed bands of osteoporosis and evidence of joint lesions. Arthralgias fluctuate during evolution of CT. Radiological signs of tumor are present in two-thirds of the CT cases, appearing either as a benign tumor of the stomach or a malignant tumor of the colon. Metastases are frequent, especially in CT of the small intestine. Increased urinary excretion of 5-hydroxyindoleacetic acid (>25 mg/24 hr-1,200 mg/24 hr in metastatic tumor) is a biological sign of CT. Etiologically, CT are equally distributed among the sexes, and they are particularly prevalent between the ages of 60 and 70 yr. The causes of arthropathies of CT are unknown although bradykinin, prostaglandins, collagen, and tryptophan have all been implicated.

4390 ESOPHAGEAL LOCALIZATIONS OF DARIER'S DISEASE: RADIOLOGICAL DESCRIPTION OF FOUR CASES. (Fre.) Larregue, M.; Katz, M.; Gasquet, C.; Lansmann, M. (Centre hospitalier regional de l'Hotel-Dieu, Poitiers, France). *Union Med. Can.* 106(1): 50-54; 1977.

Esophageal localizations of Darier's disease were detected by radiography in four patients. All four patients presented with mucosal lesions of the esophagus (ES) that were extensive in three. The buccal mucosa was papillomatous, and the fingernails of all patients were pathological. Two patients experienced intermittent dysphagia. The borders of the ES were finely indented, with a postage stamp appearance. The longitudinal fasciculation of the ES was irregular, interrupted in places, and crenated. In one patient the mucosa appeared rigid and deformed, with large folds. Fibroscopic study of the mucosae confirmed the radiographic findings. They were lined with kerotic pustules that were adherent and situated on mucosae that had lost their flexibility and normal red color. Biopsies showed no pustulous filaments or viral cytopathogenic effects. In two patients intraepidermic fissures were seen in the layers of the Malpighian bodies. Some rare cells found in the integument attested to dyskeratosis.

4391 INTRACTABLE DIARRHEA: INTESTINAL PERFUSION STUDIES AND PLASMA VIP CONCENTRATIONS IN PATIENTS WITH PANCREATIC CHOLERA SYNDROME AND SURREPTITIOUS INGESTION OF LAXATIVES AND DIURETICS. (Eng.) Krejs, G. J.; Walsh, J. H.; Morawski, S. G.; Fordtran, J. S. (Univ. Texas Health Science Center at Dallas, Southwestern Medical Sch., Dallas, TX 75235). *Am. J. Dig. Dis.* 22(4):280-292; 1977.

The secretion and absorption of water and electrolytes were measured using a triple-lumen, small intestinal perfusion method in the jejunum and ileum of 11 patients with a presumptive diagnosis of pancreatic cholera syndrome (PCS). Ultimately, PCS was actually present in only three patients, whereas six were discovered to be taking either laxatives or diuretics surreptitiously. The cause of the diarrhea could not be determined in the two remaining patients. In PCS, the major abnormality was that the jejunal mucosa secreted rather than absorbed when perfused with a plasma-like solution. By contrast, the ileum of the PCS patients absorbed a plasma-like solution normally; however, one patient failed to absorb sodium and chloride when a solution with a low (50 mM) NaCl concentration was perfused in the ileum. The volume of endogenous fluid was high in both the jejunum and ileum, presumably because of proximal small intestinal secretion. Glucose stimulated sodium absorption in all patients. Studies were repeated in one PCS patient after tumor removal, and his intestinal absorption of water and electrolytes was normal. Patients with diarrhea due to surreptitious ingestion of laxatives and diuretics showed normal absorption in the jejunum and ileum. Proximal small-bowel secretion was the major cause for diarrhea in the three patients with PCS. This cannot be a consequence of diarrhea *per se*, since it was not found in patients with long-standing diarrhea due to surreptitious drug ingestion. Small intestine perfusion studies may be helpful in the diagnosis and management of selected cases of severe chronic diarrhea.

4392 TRANSMISSION OF ROTAVIRUS GASTROENTERITIS FROM CHILDREN TO A MONKEY. (Eng.) Mitchell, J. D.; Lambeth, L. A.; Sosula, L.; Murphy, A.; Albrey, M. (Prince of Wales Children's Hosp., Sydney, Australia). *Gut* 18(2):156-160; 1977.

A pooled suspension of rotavirus, prepared from the stools of eight children with acute non-bacterial gastroenteritis, was infused into the duodenum and stomach of an infant monkey *(Nemestrina macaque)* to determine if the virus exhibits species specificity. Biopsy samples of duodenal mucosa were taken at several intervals after inoculation, examined by light and electron microscopy, and assayed for lysosomal activity. Virus-like particles were seen within and around microvilli and intracellularly within vesicles as early as 20 min after the infusion. On the fourth and fifth days, large lysosomal bodies containing numerous virus-like particles were found within epithelial cells of the duodenal villi. No such particles were seen in the pre-inoculation sample or at days 16 or 25 after infection. This is the first demonstration of the transmission of this human virus to another species.

4393 PARACOCCIDIOIDOMYCOSIS OF THE SMALL INTESTINE. ROENTGENOGRAPHIC AND ANATOMOCLINICAL ASPECTS OF 125 CASES. (Por.) Fonseca, L. C.; Mignone, C. (Clin. Med., Fac. Ciencias Medicas de Santos, Univ. Sao Paulo, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 31(3):199-207; 1976.

Roentgenographic examination of the small intestine of 125 patients with diagnosed South American blastomycosis revealed a correlation between symptoms of enteritis and small intestine abnormalities. Of 38 patients without intestinal symptoms, 33 had normal roentgenograms, 3 showed increased intestinal motility, and 2 showed abnormalities of intestinal mucosa. Of 87 who reported symptoms (abdominal pain and diarrhea), 31 had normal roentgenograms, and 56 showed abnormalities; 52% showed decreased intestinal motility, and 71.3% had morphological changes, such as thickening, ulcerated or nodular mucosa, jejunocolonic fistula, spasmodic contractions, or hypotonia. Median serum protein levels were lower in the symptomatic group (6.5 g% compared to 8.0 g% in the asymptomatic group). Autopsy in 25 cases revealed 1 case of paracoccidioidomycosis (PCM) of the duodenum, 5 cases of small intestinal PCM, 6 cases of large intestinal plus colon PCM, 7 cases of colon PCM, 5 cases with normal intestines or nonspecific abnormalities, and 20 cases with specific lesions due to *Paracoccidioides brasiliensis*. Twelve case histories are given in detail.

4394 CURRENT BIOLOGICAL ASPECTS OF TYPHOID FEVER. (Fre.) Modai, J.; Coquin, Y. (Hopital Claude-Bernard, 10 av. de la Porte d'Aubervilliers, F 75019 Paris, France). *Nouv. Presse Med.* 6(25):2222-2226; 1977.

The biological criteria, blood and stool cultures and serology, of typhoid fever were studied in 90 patients over a 5-yr period. The patients were treated with chloramphenicol or thiamphenicol (43 patients), ampicillin or trimethoprim-sulfamethoxazole (25), or switched from the first regimen to the second (20) because of the development of neutropenia or complications. Therapy with phenicols was stopped in 20 of the patients. The bacteria was isolated in 79% of blood and 23% of stool cultures, and antibodies (O and H agglutinins) were found in 86% of blood samples. Hemograms taken before and after therapy showed granulocytopenia in patients treated with phenicols as well as those given ampicillin and trimethoprimsulfamethoxazole. The average pretherapy neutrophil count of 4,340-

5,400 mm^3 dropped to 2,860-3,000 mm^3 after treatment. The responsible organism was isolated in 88% of the patients: *Salmonella typhi* (70), *S. paratyphoid* A (2), and *S. paratyphoid* B (7). Typhoid was diagnosed by all three criteria in only 15/90 of the patients, emphasizing the importance of a combination of biological criteria for the diagnosis of typhoid, as more relatively asymptomatic forms begin to appear in the population.

4395 COMPARATIVE STUDY OF THE VALUE OF THE CALCIUM, SECRETIN, AND MEAL STIMULATED INCREASE IN SERUM GASTRIN TO THE DIAGNOSIS OF THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Lamers, C. B. H.; Van Tongeren, J. H. M. (Univ. Hosp. St. Radboud, Nijmegen, Netherlands). *Gut* 18(2):128-134; 1977.

To evaluate the usefulness of provocation tests in the diagnosis of the Zollinger-Ellison (ZE) syndrome, stimulation tests with calcium (15 mg/kg/3 hr) and secretin GIH (1 U/kg/30 sec) were performed in 15 patients with histologically proven or suspected ZE syndrome. In the nine patients without previous gastric surgery, meal-stimulated serum gastrin levels were also measured. These tests were also performed in normal subjects and in patients with duodenal ulcer, antrectomy, total gastrectomy, and achlorhydria. All tests were considered to be positive if a more than a 50% increase in serum gastrin was found. There were only two false-negative test results in ZE patients. There were no false-positive tests in 69 patients without gastrinoma. No complications were encountered. The two ZE patients with negative secretin stimulation tests had negative calcium provocation tests as well, in spite of histologically proven gastrinoma. In 11 patients with suspected or proven ZE syndrome and basal serum gastrin levels of less than 1,000 pg/ml, a rather good correlation ($r=0.841$; $p<0.01$) was found between the percentage increase in serum gastrin after stimulation by calcium and secretin. The results indicate that secretin stimulation is the provocation test of choice in the diagnosis of the ZE syndrome. Meal-stimulated serum gastrin levels are helpful only in patients without previous gastric surgery.

4396 BASAL AND CALCIUM-STIMULATED GASTROESOPHAGEAL SPHINCTER PRESSURE IN PATIENTS WITH ZOLLINGER-ELLISON SYNDROME. (Eng.) Snyder, N.; Hughes, W. (Univ. Texas Medical Branch, Galveston, TX 77550). *Gastroenterology* 72(6):1240-1243; 1977.

To determine the relation between fasting serum gastrin and lower esophageal sphincter (LES) pressure, LES pressure was measured in six patients with the Zollinger-Ellison syndrome (ZES) and hypergastrinemia, and in six patients with duodenal ulcer and normogastrinemia. Basal LES pressure in ZES patients (17.0 ± 3.7 mm Hg) was similar to basal LES pressure in duodenal ulcer patients (18.3 ± 3.5 mm Hg, $p>0.10$). LES pressure and serum gastrin concentration were not related in the ZES patients ($r=0.03$) or in the duodenal ulcer patients ($r=0.20$). Intravenous infusion of calcium gluconate in ZES patients produced a marked rise in serum gastrin concentration ($\Delta=1,580 \pm 1,110$ pg/ml, $p<0.001$), and a moderate but significant rise in LES pressure ($\Delta=5.9 \pm 0.9$ mm Hg, $p<0.05$). In duodenal ulcer patients, calcium infusion produced only slight rises in gastrin concentration ($\Delta=10 \pm 12$ pg/ml), and LES pressure ($\Delta=2.1 \pm 0.5$ mm Hg), which were not significant ($p>0.10$). This study suggests that basal LES pressure is not regulated by blood gastrin levels in the ZES. The calcium infusion study suggests that the LES pressure in patients with ZES may respond to acute changes in endogenous gastrin levels.

4397 TWO DECADES OF GASTROINTESTINAL RESEARCH: A PERSPECTIVE. (Eng.) Nyhus, L. M. (Abraham Lincoln Sch. Medicine, Univ. Illinois at the Medical Center, Chicago, IL). *Am. J. Surg.* 131(1): 3-18; 1976.

4398 THE TROPHIC ACTION OF GASTROINTESTINAL HORMONES. (Eng.) Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 70(2): 278-288; 1976.

4399 GASTROINTESTINAL HORMONES. (Eng.) Sullivan, S. N. (King's Coll. Hosp., London, England). *Can. J. Surg.* 19(4):295-310; 1976.

4400 FIBER FEEDING--FAD OR FINGER OF FATE? (Eng.) Vaisrub, S. (535 N. Dearborn St., Chicago, IL 60610). *JAMA* 235(2):182-183; 1976.

4401 LOW FIBER CONTENT OF CONNECTICUT DIETS. (Eng.) Dorfman, S. H.; Ali, M.; Floch, M. H. (Norwalk Hosp., Norwalk, CT 06856). *Am. J. Clin. Nutr.* 29(1):87-89; 1976.

4402 DIET AND DISEASE: DIETARY FIBRE. (b) VEGETABLE DIETARY FIBRE--POTENT PITH. (Eng.) Eastwood, M. A. (Western General Hosp., Edinburgh, Scotland). *R. Soc. Health J.* 95(3):188-190; 1975.

4403 DIET AND DISEASE: DIETARY FIBRE. (c) DIETARY FIBRE--ITS NATURE AND ROLE IN THE DIET. (Eng.) Southgate, D. A. T. (Dunn Nutritional Lab., Univ. Cambridge, Cambridge, England). *R. Soc. Health J.* 95(3):191-193; 1975.

4404 DIET AND DISEASE: DIETARY FIBRE. (d) DIVERTICULAR DISEASE OF THE COLON: THE EFFECT OF THE HIGH FIBRE DIET. (Eng.) Painter, N. S. (Manor House Hosp., London, England). *R. Soc. Health J.* 95(3):194-198; 1975.

4405 INFLUENCE OF A MEAL ON THE ABSORPTION OF CIMETIDINE: A NEW HISTAMINE H_2-RECEPTOR ANTAGONIST. (Eng.) Spence, R. W.; Creak, D. R.; Celestin, L. R. (Frenchay Hosp., Bristol BS16 1LE, England). *Digestion* 14(2):127-132; 1976.

4406 HYDROLYSIS AND ABSORPTION OF CARBOHYDRATES IN THE SMALL INTESTINE OF THE ELDERLY AND SENILE. (Rus.) Valenkevich, L. N. (Propedeutic Dept. Internal Diseases, Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Klin. Med. (Mosk.)* 54(10):68-72; 1976.

4407 INTESTINAL DIALYSIS IN 1975 PERSPECTIVE: SORBENTS AND INTESTINAL LOOP NITROGEN TRANSPORT. (Eng.) Schloerb, P. R. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Kidney Int.* 10(Suppl. 7):S248-S250; 1976.

4408 INVESTIGATION OF THE IMMUNOGLOBULINS IN INTESTINAL FLUID OF MALNOURISHED CHILDREN. (Eng.) Cohen, A. L.; Ruvinsky, R. O.; Abadi, S.; Reboiras, J. J.; Grinszpan, I. L.; Goijman, I.; *et al.* (Rua Cesario Mota Junior, 476--ap. 1302-A. 01221--V. Buarque, Sao Paulo, Brazil). *Arq. Gastroenterol.* 13(3):189-195; 1976.

4409 CLINICO-ROENTGENOLOGICAL MANIFESTATIONS OF LYMPHOGRANULOMATOSIS OF THE GASTROINTESTINAL TRACT. (Rus.) Pereslegin, I. A.; Popova, Z. P.; Kameneva, S. I.; Filkova, E. M. (Moscow Scientific Res. Inst. Roentgenology and Radiology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (6):16-21; 1976.

4410 INTESTINAL LESIONS IN IMMUNE DEFICIENCY. (Eng.) Eidelman, S. (Rambam Univ. Hosp., Haifa, Israel). *Hum. Pathol.* 7(4):427-434; 1976.

4411 HYPOTHESIS: ENERGY WASTAGE IN ALCOHOLISM AND DRUG ABUSE: POSSIBLE ROLE OF HEPATIC MICROSOMAL ENZYMES. (Eng.) Pirola, R. C.; Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY). *Am. J. Clin. Nutr.* 29(1):90-93; 1976.

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4413 ABSORPTION OF XYLOSE, GLUCOSE, GLYCINE, AND FOLIC (PTEROYLGLUTAMIC) ACID IN ZAMBIAN AFRICANS WITH ANAEMIA. (Eng.) Cook, G. C. (Hosp. Tropical Diseases, 4 St. Pancras Way, London NW1 OPE, England). *Gut* 17(8):604-611; 1976.

4414 THE EFFECT OF COPPER ON IRON METABOLISM IN PATIENTS WITH GASTROGENIC ANEMIA. (Rus.) Fuzailov, Yu. M. (Dept. Biochemistry, M. I. Kalinin Andizhan Medical Inst., Andizhan, USSR). *Vopr. Pitan.* (4):67-70; 1976.

4415 DUPLICATION OF THE ALIMENTARY TRACT. (Eng. Taft, D. A.; Hairston, J. T. (Mason Clinic, 1118 9th Ave., Seattle, WA 98101). *Am. Surg.* 42(7): 455-462; 1976.

4416 SMOOTH MUSCLE TUMORS OF THE GASTROINTESTINA TRACT AND RETROPERITONEUM. A PATHOLOGIC ANALYSIS OF 100 CASES. (Eng.) Ranchod, M.; Kempson, R. L. (Stanford Univ. Medical Center, Stanford, CA 94305). *Cancer* 39(1):255-262; 1977.

4417 BARIUM IMPACTION AS A COMPLICATION OF GASTROINTESTINAL SCLERODERMA. (Eng.) Thompson, M. A., Jr.; Summers, R. (Univ. Iowa Hosp., Iowa City, IA 52242). *JAMA* 235(16):1715-1717; 1976.

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4424 DELAYED SMALL BOWEL TRANSIT IN ACUTE AND CHRONIC DIARRHEAL SYNDROMES [Abstract]. (Eng.) Cupello, J. L.; Rodriguez, J. T.; Flores, F. N.; Huang, T. L.; Nichols, B. L. (Baylor Coll. Medicine, Houston, TX 77025). *Pediatr. Res.* 10(4):353; 1976.

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4430 THE CLINICAL FEATURES OF INFANTILE GASTROENTERITIS DUE TO ROTAVIRUS. (Eng.) Carr, M. E.; McKendrick, G. D. W.; Spyridakis, T. (Rush Green Hosp., Romford, Essex RM7 OYA, England). *Scand. J. Infect. Dis.* 8(4):241-243; 1976.

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4437 URGENT FIBRE-OPTIC PANENDOSCOPY IN UPPER GASTRO-INTESTINAL HAEMORRHAGE. (Eng.) Novis, B. H.; Clain, J.; Barbezat, G.; Bank, S. (Groote Schuur Hosp., Cape Town 7925, South Africa). *S. Afr. Med. J.* 50(4):93-96; 1976.

4438 ELECTROSEALING UPPER GI BLEEDING THROUGH AN ENDOSCOPE, ELECTROCOAGULATION STOPS ACTIVE HEMORRHAGE. (Eng.) Anonymous. (No affiliation given). *Med. World News* 17(3):26; 1976.

4439 EXPERIMENTAL CONTROL OF GASTROINTESTINAL HEMORRHAGE VIA THE ENDOSCOPE: A NEW ERA DAWNS. (Eng.) Katon, R. M. (Univ. Oregon Health Sciences Center, Portland, OR). *Gastroenterology* 70(2):272-277; 1976.

4440 ANTIINFLAMMATORY DRUGS AND GASTROINTESTINAL BLEEDING: A COMPARISON OF ASPIRIN AND IBUPROFEN. (Eng.) Schmid, F. R.; Culic, D. D. (Northwestern Univ. Medical Center, Chicago, IL 60611). *J. Clin. Pharmacol.* 16(8/9):418-425; 1976.

4441 GASTROINTESTINAL BLEEDING IN CHILDREN. (Eng.) Raffensperger, J. G.; Luck, S. R. (Children's Memorial Hosp., 2300 Children's Plaza, Chicago, IL 60614). *Surg. Clin. North Am.* 56(2):413-424; 1976.

4442 SPIGELIAN HERNIA. (Eng.) Som, P. M.; Khilnani, M. T.; Wolf, B. S.; Beranbaum, S.

L. (Mount Sinai Hosp., New York, NY). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 17(3):305-312; 1976.

4443 PLASMA AND PARATHYROID TUMOR TISSUE GASTRIN AND HYPERPARATHYROIDISM. (Eng.) Wesdorp, R. I. C.; Wang, C. A.; Hirsch, H.; Fischer, J. E. (Massachusetts General Hosp., 32 Fruit St., Boston, MA 02114). *Am. J. Surg.* 131(1):60-63; 1976.

4444 A STUDY OF LACTASE DEFICIENCY AS A PATHOGENETIC FACTOR IN THE CLINICAL PICTURE OF ACUTE AND CHRONIC INTESTINAL DISEASES. (Rus.) Gromashevskaya, L. L.; Gebesh, V. V.; Stremetsky, G. F.; Mikhailova, A. M.; Bogachik, N. A. (Kiev Scientific Res. Inst. Infectious Diseases, Kiev, USSR). *Sov. Med.* (12):82-88; 1976.

4445 OMPHALOCELE. (Eng.) Kim, S. H. (Massachusetts General Hosp., Boston, MA 02114). *Surg. Clin. North Am.* 56(2):361-371; 1976.

4446 DEGRADATION OF DEOXYCHOLIC ACID BY Pseudomonas Sp. NCIB 10590. (Eng.) Barnes, P. J.; Baty, J. D.; Bilton, R. F.; Mason, A. N. (Dept. Chemistry, Liverpool Polytechnic, Liverpool L3 3AF, England). *Tetrahedron* 32(1):89-93; 1976.

4447 DIFFERENTIAL DIAGNOSIS BETWEEN FOOD TOXICOINFECTIONS (SALMONELLOSIS) AND THE SYNDROME OF SUBARACHNOID HEMORRHAGE. (Rus.) Brodov, L. E.; Maleyev, V. V.; Kutsemilova, A. P. (Dept. Infectious Pathology, Central Scientific Res. Inst. Epidemiology, USSR Ministry Public Health, Moscow, USSR). *Vrach. Delo* (11):143-145; 1976.

4448 CANINE SALMONELLOSIS: A REVIEW AND REPORT OF DOG TO CHILD TRANSMISSION OF Salmonella enteritidis. (Eng.) Morse, E. V.; Duncan, M. A.; Estep, D. A.; Riggs, W. A.; Blackburn, B. O. (Dept. Microbiology, Purdue Univ., Lafayette, IN 47907). *Am. J. Public Health* 66(1):82-84; 1976.

4449 THE LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) IN ZOLLINGER-ELLISON SYNDROME (ZES). BASAL LEVELS AND RESPONSE TO CALCIUM INFUSION [Abstract]. (Eng.) Snyder, N.; Hughes, W. (Univ. Texas Medical Branch, Galveston, TX). *Clin. Res.* 24(1):14A; 1976.

4450 MORTALITY AFTER LAPAROTOMY. A 10-YEAR SERIES. (Eng.) Tera, H.; Aberg, C. (Univ. Hosp., Linkoping, Sweden). *Acta Chir. Scand.* 142(1):67-72; 1976.

4451 HEPATIC DRUG METABOLISM IN CHRONIC RENAL FAILURE (CRF) [Abstract]. (Eng.) Scherrer, S.; Haldimann, B.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 14(5/6):547; 1976.

4452 DISORDERS OF THE GASTROINTESTINAL TRACT IN ACUTE MYOCARDIAL INFARCTION. (Rus.) Kapanadze, G. V.; Kochlamazashvili, A. I. (Inst. Therapy, Georgian SSR Ministry Public Health, Tbilisi, USSR). *Klin. Med. (Mosk.)* 54(10):116-119; 1976.

4453 ACUTE GASTRIC CHANGES IN PATIENTS WITH ACUTE STROKE. PART 1: WITH REFERENCE TO GASTROENDOSCOPIC FINDINGS. (Eng.) Kitamura, T.; Ito, K. (Res. Inst. Brain and Blood Vessels, 6-10 Senshu-Kubotamachi, Akita, Japan). *Stroke* 7(5):460-463; 1976.

4454 XYLOSE ABSORPTION BEFORE AND AFTER SURGICAL CORRECTION OF ATRIAL SEPTAL DEFECT (AS AND VENTRICULAR SEPTAL DEFECT (VSD). (Eng.) Markiewicz, A.; Wojczuk, D.; Iljin, W. (Silesian Sch. Medicine, Medykow 12, 40-752 Katowice, Poland). *Eur. J. Pediatr.* 124(1):57-63; 1976.

4455 SMALL INTESTINAL PERFORATION DUE TO SECONDARIES FROM BRONCHOGENIC CARCINOMA. (Eng.) Skene-Ramanathan, T.; Skene-Smith, H.; Singh, D.; Sivanesar S. (Univ. Hosp., Kuala Lumpur, Malaysia). *Br. J. Dis. Chest* 70(2):121-124; 1976.

See also, 3840, 3850, 3861, 3869, 3912, 3938, 3984, 3988, 3992, 4047, 4062, 4071, 4076, 4086, 4100, 4112, 4114, 4115, 4136, 4151, 4154, 4164, 4165, 4166, 4179, 4184, 4186, 4189, 4192, 4217, 4222, 4236, 4247, 4477.

GENERAL

Parasitology

4456 ULTRASOUND AND ABDOMINAL HYDATID DISEASE. (Eng.) Vicary, F. R.; Cusick, G.; Shirley, I. M.; Blackwell, R. J. (Univ. Coll. Hosp., Gower St., London WC1, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(1):29-31; 1977.

The cases of seven patients are presented in whom a total of 22 hydatid cysts were located by ultrasound grey-scale and conventional B-scanning techniques. The patients included three women and four men. Nine of the cysts occurred in the peritoneal cavity, and the remainder occurred in the liver. Two patients had previously had hydatid cysts of the lung. Laparotomy confirmed the presenc of 19 abdominal cysts. The grey-scale techniques did not appear to add appreciably to the ease of diagnosis. Ultrasound is useful in the diagnosis of hydatid cysts and in determining their location, volume, and number.

4457 EPIDEMIOLOGIC INVESTIGATION OF ECHINOCOCCOSIS IN AMERICAN INDIANS LIVING IN ARIZONA AND NEW MEXICO. (Eng.) Schantz, P. M.; Von Reyn, C. F.; Welty, T.; Andersen, F. L.; Schultz, M. G.; Kagan, I. G. (Center for Disease Control, U.S. Dept. Health, Education, and Welfare, Atlanta, GA 30333). *Am. J. Trop. Med. Hyg.* 26(1): 121-126; 1977.

As part of a regional epidemiologic study, 10 cases of echinococcosis diagnosed in American Indians in Arizona and New Mexico between 1972 and 1975 were investigated. When possible, patients were visited in their homes to identify factors associated with local parasite transmission, to detect possible additional cases among family members, and to perform diagnostic tests on dogs. Six patients were Navajo, two Zuni, and two Santo Domingo Indians. Since dogs are usually kept in close proximity to the homes, the opportunities for exposure to *Echinococcus granulosus* are numerous. Dogs owned by three of the Navajo patients were infected with *E. granulosus*. Data from epidemiological studies suggest that humans acquired their infections from dogs that had contracted infections from two sources. The first source was sheep raised locally in rural areas of the Navajo reservation where the infection is enzootic in the dog-sheep cycle. The widespread practice of home butchering facilitated the transmission of infection. The second source of human infection was dogs that became infected by eating viscera of sheep of off-reservation origin, which were purchased and butchered by families in urban areas of the Navajo reservation and in the Zuni and Santo Domingo pueblos.

4458 TRANSMAMMARY PASSAGE OF Strongyloides SP. LARVAE IN THE HUMAN HOST. (Eng.) Brown, R. C.; Girardeau, M. H. F. (Medical Benevolence Foundation, Woodville, TX 75979). *Am. J. Trop. Med. Hyg.* 26(2):215-219; 1977.

The prevalence of infection with *Strongyloides fuelleborni* and hookworms (*Ancylostoma duodenale* and *Necator americanus*), and the possible transmammary passage of these parasites, was studied in the residents of an African village. Stool examinations revealed that 34% of 76 infants under 200 days of age were infected with *S. fuelleborni* and 8% were infected with hookworms. Infection rates in the general population were 44% for *S. fuelleborni* and 90% for hookworms. The examination of 113 milk samples from 25 nursing mothers revealed the presence of *Strongyloides* larvae in one case; stool specimens of her child were negative for eggs and parasites at 5 days of age. *S. fuelleborni* may be transmitted via the milk in humans but further studies are necessary to clarify the matter.

4459 EOSINOPHILIC GRANULOMATOUS HEPATITIS. REPORT OF A CASE OF TOXOCARIASIS. (Fre.) Bogomoletz, W. (Queen Mary's Hosp., Rochampton, London SW 15, England). *Ann. Anat. Pathol. (Paris)* 22(1):75-79; 1977.

A case of eosinophilic granulomatous hepatitis, due to toxocariasis, in a 2-yr-old girl and the problem of histological differential diagnosis is presented. The girl had anorexia and asthenia for 2 months. Marked hepatomegaly, moderate ascites, and an enlarged heart were found on examination. Bone marrow and ascitic fluid contained numerous eosinophils. Progressive and marked eosinophilia with a constant rise in IgE and a hemoglobin of 7 g were present. Liver biopsy revealed a single histiocytic and giant cell granuloma without necrosis but with numerous eosinophils. Serial sections showed no parasites or microorganisms in the lesion, and a differential diagnosis of a hypereosinophil syndrome with polyvisceral lesions was made. Seroimmunological reactions were positive for *Toxocara canis*. The family had two dogs, both bearers of *T. canis*, and two members of the family had highly elevated eosinophilia and IgE as well as positive tests for *T. canis*. The patient was treated with prednisolone and thiabendazole. Hepatomegaly and cardiomegaly diminished and ascites disappeared but eosinophilia (3,000-5,000 eosinophils/mm^3) persisted.

4460 AMEBIASIS. (Ger.) Werner, G. T.; Stickl, H. (Geigerstrasse 11, D-8000 Munchen 21, W. Germany). *Med. Klin.* 71(50):2218-2223; 1976.

4461 CURRENT ASPECTS OF ACUTE AMEBIC ABSCESS OF THE LIVER: THREE OBSERVATIONS. (Fre.) Dournovo, P.; Courillon, A.; Richard, J. P.; Farge, B.; Thibault, Ph. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Nouv. Presse Med.* 5(34):2237-2239; 1976.

4462 ACQUIRED RESISTANCE TO INFECTION IN AN ANIMAL MODEL OF GIARDIASIS. (Eng.) Roberts-Thomson, I. C.; Stevens, D. P.; Mahmoud, A. A. F.; Warren, K. S. (Case Western Reserve Univ., Cleveland, OH 44106). *J. Immunol.* 117(5, Part 2): 2036-2037; 1976.

4463 DIAGNOSIS OF LAMBLIASIS BY FIBRE-ENDOSCOPY. (Eng.) Ferwerda, J.; Dekker, W. (St. Elisabeth's of Groote Gasthuis, Boerhaavelaan 22, Haarlem, Netherlands). *Tijdschr. Gastroenterol.* 19(6): 413-416; 1976.

4464 MIGRATION OF LYMPHOBLASTS TO THE SMALL INTESTINE. I. EFFECT OF Trichinella spiralis INFECTION ON THE MIGRATION OF MESENTERIC LYMPHOBLASTS AND MESENTERIC T LYMPHOBLASTS IN SYNGENEIC MICE. (Eng.) Rose, M. L.; Parrott, D. M. V.; Bruce, R. G. (Western Infirmary, Glasgow G11 6NT, Scotland). *Immunology* 31(5):723-730; 1976.

See also, 3823, 3882, 4113, 4178.

GENERAL

Regional Enteritis

4465 TREATMENT OF CROHN'S DISEASE WITH HOME PARENTERAL NUTRITION. (Eng.) Rault, R. M. J.; Scribner, B. H. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 72(6): 1249-1252; 1977.

Nine cases of severe Crohn's enterocolitis in patients treated by home parenteral nutrition are described. Seven patients had a short bowel syndrome after multiple bowel resections. In two patients home parenteral nutrition was used as primary therapy. The treatment was well tolerated and proved successful in eight patients. Three patients have been able to discontinue parenteral infusions and currently are in remission. The main complications were associated with the access device, which was replaced in three patients. Five patients currently have abnormal liver function tests without progressive liver disease. In two patients with active inflammatory bowel disease complicated by perirectal or intraabdominal sepsis, marked improvement occurred while on home parenteral nutrition. It is concluded that home parenteral nutrition is an important new therapeutic modality that can reduce or even eliminate the need for repeated or prolonged hospitalization of patients with short bowel syndrome complicating severe Crohn's disease. Home parenteral nutrition, because it is relatively simple and safe, lends itself to early intervention in severe fulminant cases of Crohn's disease. The patient is more rapidly rehabilitated, and his fear of early relapse and recurrent malnutrition is minimized, thus facilitating a prolonged period of bowel rest that can lead to eventual remission. Home parenteral nutrition should be kept in mind as a possible alternative to early surgical intervention in selected cases of severe Crohn's disease.

4466 GROWTH, COURSE, AND PROGNOSIS AFTER SURGERY FOR CROHN'S DISEASE IN CHILDREN AND ADOLESCENTS. (Eng.) Homer, D. R.; Grand, R. J.; Colodny, A. H. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *Pediatrics* 59(5):717-725; 1977.

Thirty-seven children and adolescents were followed from 2 to 26 yr after resections for Crohn's disease in order to determine the long-term responses to such surgery. Twenty-eight patients had disease that involved both the colon and terminal ileum; disease was limited to the small intestine in eight patients and to the stomach in one. At the time of surgery 16 patients were at or below the third percentile for weight and only 16 had reached puberty (all of these were older than 14.5 yr). Fourteen patients (11 prepubertal, 3 pubertal) had severe impairment of linear growth; height was at or below the third percentile or linear growth was absent for more than a year. At the time of the first operation, seven patients had incomplete resections and have had persistent disease. The remaining 30 patients had complete resections as determined by gross and histological criteria. Of these, 12 have had recurrences and 18 have been free of disease. Of the 11 prepubertal patients with preoperative linear growth failure, only 2 had catch-up growth after surgery. The remaining nine and all of the pubertal patients have either failed to grow or have maintained their height in their preoperative percentile. Catch-up growth after surgery for Crohn's disease occurs only in children operated on before puberty in whom there is no early recurrence. The recurrence rate for this group of patients was 30%; most recurrences occurred within 2 yr of the initial resection. Growth failure may be considered to be an important indication for surgery in the prepubertal child with Crohn's disease, but it probably is not an indication after onset of puberty.

4467 BILE ACID METABOLISM AND PLASMA PROTEIN TURNOVER IN CROHN'S DISEASE. (Eng.) Lenz, K.; Jensen, K. B.; Jarnum, S. (Rigshospitalet, Copenhagen, Denmark). *Gastroenterology* 11(7):721-727; 1976.

Postprandial duodenal bile acids, intestinal protein loss, and albumin and IgG turnover were studied in 19 patients with Crohn's disease and in 20 patients with chronic diarrhea to establish an interdependence between these parameters in Crohn's disease. Duodenal bile acid concentration was decreased in 9 of 19 patients with Crohn's disease and in 5 of 20 patients with unexplained diarrhea. Free bile acids were found in the duodenal juice of one patient only. The glycine/taurine ratio increased in 8 of 17 patients with Crohn's disease, but in only one of the 20 control patients. Abnormal intestinal protein loss was present in 13 of 14 patients with Crohn's disease. The fractional catabolic rate of albumin and of IgG increased in all 17 cases of Crohn's disease studied except the patient with free bile acids and no abnormal protein loss. The glycine/taurine ratio was significantly correlated to the fractional catabolic rate of albumin ($r=0.54$, $p<0.05$) and to that of IgG ($r=0.70$, $p<0.01$), which are always present in active Crohn's disease. It is concluded that the glycine/taurine ratio is a valuable indicator of terminal ileopathy in nonoperated patients with terminal ileitis.

4468 ANALYSIS OF THE LYMPHO-PLASMACYTIC INFILTRATE IN CROHN'S DISEASE WITH SPECIAL REFERENCE TO IDENTIFICATION OF LYMPHOCYTE-SUBPOPULATIONS.

(Eng.) Meuwissen, S. G.; Feltkamp-Vroom, T. M.; De La Riviere, A. B.; Von Dem Borne, A. E.; Tytgat, G. N. (Central Lab. Netherlands Red Cross Blood Transfusion Service, Amsterdam, Netherlands). *Gut* 17(10):745-836; 1976.

Lympho-plasmocytic infiltrates in cryostat sections from patients with Crohn's disease (29), ulcerative colitis (16), and control subjects without inflammatory diseases (12) were studied. Specific antilymphocyte antiserum and a specific anti-T-lymphocyte antiserum were used. T-cells were present in inflammatory infiltrates, particularly in the deeper layers of the bowel wall, while non-T-lymphocytes predominate (± 70-80%) in the more superficial layers of the gut, in lymphoid follicles, and around areas of ulceration. Increased numbers of T-cells were found infiltrating between muscle fiber. Epitheloid cell granulomata was detected in the submucosa. Immunoglobulins containing plasma cells were counted, using specific IgA, IgM, and IgG antisera in serial sections. Reduction in the number of IgA-containing plasma cells in the lamina propria, particularly in areas with the characteristic transmural inflammation of Crohn's disease patients was reported. This resulted in a significant reduction of the IgA/IgM plasma cell ratio in Crohn's disease, in comparison with ulcerative colitis and controls. Further analysis of the morphology and function of T-lymphocytes and T-lymphocyte subpopulations is suggested.

4469 THE EXTRA-INTESTINAL COMPLICATIONS OF CROHN'S DISEASE AND ULCERATIVE COLITIS: A STUDY OF 700 PATIENTS.

(Eng.) Greenstein, A. J.; Janowitz, H. D.; Sachar, D. B. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Medicine* 55(5):401-412; 1976.

Extra-intestinal complications in four groups of patients with regional enteritis (213 patients), ileocolitis (223), Crohn's colitis (62), and ulcerative colitis (202) were reported. Incidence of colitis-related manifestations (joint, skin, mouth, and eye disease) was higher in patients with Crohn's disease ($p<0.001$, 42%) than in patients with disease restricted exclusively to the small bowel (23%). These complications occurred in 36% of patients and responded to medical or surgical treatment of the underlying bowel disease; joints were involved in 23% of the cases, skin in 15%, and the mouth and eyes in 4% each. Erythema nodosum was significantly more frequent in Crohn's disease ($p<0.05$), and pyoderma gangrenosum was observed most often in ulcerative colitis ($p<0.05$). Disorders related to small bowel pathophysiology included malabsorption, gallstones, kidney stones, noncalculous hydronephrosis, and hydroureter. Malabsorption was associated with ileocolitis and regional enteritis (6.7%), while gallstones (11%) and renal stones (9%) were more frequent in Crohn's disease. Osteoporosis or osteomalacia was reported in ulcerative colitis (3%), granulomatous colitis (5%), and disease of the small bowel (3%). Generalized demineralization was reported in two patients. Liver disease (5%), peptic ulcer (10%), and amyloidosis (1%) were reported in some patients.

4470 RADIOLOGICAL FINDINGS IN ESOPHAGITIS DUE TO CROHN'S DISEASE.

(Ger.) Frohlich, H.; Huchzermeyer, H.; Stender, H. St. (Institut fur klinische Radiologie, Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, 3000 Hannover-Kleefeld, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6):497-300; 1976.

The radiological changes in esophagitis due to Crohn's disease (CD) are described in five patients. Heterogeneous radiological, anatomical, and histological findings were noted. Increasing mucosal relief of the middle and lower esophagus was seen in a 12-yr-old boy who did not develop stenosis. Histologically, there were only widespread ulcerous and nonspecific inflammatory changes. However, the patient died from severe toxic shock after colonic perforation. Autopsy confirmed CD with involvement of the mouth, esophagus, ileum, and colon. Another patient showed rigid stenosis in the lower third of the esophagus. Esophagectomy revealed multiple ulcers and nonspecific granulocyte inflammation of the entire esophageal wall, with involvement of the lymph nodes and widespread submucosal fibroses. The patient died postoperatively of circulatory failure. The third patient developed a conical constriction of the lumen after a Billroth II operation. Stenosis with prestenotic esophageal dilatation and a hyperemic edematous mucosa with white fibrin deposits were seen by esophagoscopy. Histologically, highly ulcerated epithelia with marked inflamed WBC infiltration as well as capillary-rich granulation tissue were noted. The patient died 3 weeks postsurgery; autopsy confirmed CD. Similar findings were found in the fourth patient. Persistent constrictions were noted in the fifth patient, who presented with dysphagia, pain, and pressure behind the sternum. Irregular stenosis of the esophagus, which was suspected to be a stenosing carcinoma of the esophagus, developed within 4 months. At esophagectomy, the overgrown esophagus was severed and anastomized to the fundus. Histologically, regional enteritis of the esophagus was confirmed. At a 5-yr follow-up, no abnormalities were noted.

4471 CROHN'S DISEASE OF THE ESOPHAGUS. (Fre.) Gaucher, P.; Bigard, M. A.; Begue, J. Y.; Laugros, A.; Regent, D.; Macinot, C. (C.H.U. de Nancy-Brabois, F 54500 Vandoeuvre, France). *Nouv. Presse Med.* 6(16):1369-1372; 1977.

Esophageal localization was demonstrated in 3/18 patients with Crohn's disease (11 women, 7 men; mean age of 31 yr) by routine endoscopy of the esophagus with multiple biopsies. Clinical symptoms were absent in the other 15 patients, whereas the 3 patients with esophageal lesions had epigastric heartburn. Radiology detected ulceration in two patients but no stenosis. Endoscopy showed esophagitis in three patients; two of three patients had previously presented with multiple esophageal lesions. Histological examination of the biopsies revealed inflammation in five, and a case of nonspecific transmural inflammatory infiltration. An epithelioid granuloma was discovered in two of three patients with esophageal localization, which have not previously been reported in the literature. In conclusion, esophageal localizations underline the ubiquitous character of Crohn's disease and emphasize the importance of endoscopy.

4472 INVOLVEMENT OF THE STOMACH IN CROHN'S DISEASE. (Ger.) Hirt, J. J.; Junginger, T.; Frotz, H.; Tismer, R. (Chirurgische Universitatsklinik, Joseph-Stelzmann-Strasse 9, D-5000 Koln 41, W. Germany). *Leber Magen Darm* 6(3):168-171; 1976.

Involvement of the stomach, ileum, and colon was observed in a 31-yr-old man operated on for Crohn's disease (CD). Only in 2% of cases of CD is the stomach involved, and this man was 1 of a series of 59 CD patients. Initially, the patient experienced diarrhea, nausea, vomiting, and abdominal pain. X-ray examination of the stomach revealed marked initial stenosis with filling defect, and a subsequent examination of the antrum showed widespread stenosis of the prepylorus. Gastroscopy revealed erosive, aphthoid lesions; biopsy confirmed the diagnosis of CD of the stomach. Contrast radiography showed stenosis of the transverse colon and inflammatory changes in the cecum with typical signs of granulomatous colitis. Coloscopy detected inflammation of the mucosa, ulceration, and stricture of the lumen. Laparotomy showed that the duodenum was free of inflammatory changes. A distal hemigastrectomy was performed; the terminal ileum and ascending and transverse colon were excised. Histological examination of the excised tissue showed signs of CD. No postoperative complications developed and the patient returned to work.

4473 MANIFESTATIONS OF REGIONAL ENTERITIS (CROHN'S DISEASE) IN THE STOMACH AND DUODENUM. (Ger.) Koischwitz, D.; Brecht, G.; Gerlach, F.; Lackner, K. (Radiologische Klinik der Universitat Bonn, 5300 Bonn-Venusberg, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6):501-507; 1976.

The manifestations of Crohn's disease in the stomach and duodenum of nine patients are presented. Tissue specimens were taken in all patients by endoscopy. Only one patient had histological mucosal changes typical of the disease, whereas the others showed uncharacteristic mucosal inflammation. The most common symptoms were stomach pain, mainly in the right lower stomach and epigastrium, diarrhea, nausea, and vomiting. Typical radiological changes were seen in the stomach and duodenum of all patients. Cobblestone mucosa of the antrum and pars pylorica was evident in four patients. Six patients also had multiple needle-sized ulcers of the antrum, whereas three had a funnel-shaped narrowing of the antrum. The changes extended to the duodenal bulbus and descending colon in eight patients. Duodenal stenosis was also evident in three patients, and one had a deformity of the pylorus. One patient died of renal insufficiency with amyloidosis. Gastroenterostomy with selective vagotomy was done in one patient with gastric stenosis. One patient, who previously had a gastroenterostomy, developed stenosis in the area of the duodenojejunal flexure. Following a duodenojejunostomy, the patient remained symptom-free. One patient had an ileocolectomy and one, a hemicolectomy, whereas four were treated with conservative drug therapy.

4474 ANAL AND PERIANAL COMPLICATIONS OF CROHN'S DISEASE. (Ger.) Krieg, H.; Brunner, H.; Gamstatter, G.; Gronninger, J. (Chirurgische Klinik der Universitat, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Munch. Med. Wochenschr.* 119(6):193-196; 1977.

Anal complications associated with Crohn's disease (CD) were noted in 59/153 patients. Widespread fistulas of the anal or perianal region were conspicuous. Crohn's disease-like skin and mucosal changes in the form of granulomatous infiltrates and fissures were observed less frequently. A diagnosis of severe proctitis with mucosal ulceration and scarred stenosis was made in 11 patients. The foci of the intestinal disease in the 59 patients were mostly in the terminal ileum. Crohn's disease restricted to the rectum was observed in four patients. An enterectomy was performed in 49 patients with inflamed primary foci, followed by end-to-end anastomosis; the surgery included nine coloproctectomies and six abdominosacral proctectomies. A preterminal natural anus was created in 11 patients until local inflammation had healed. Postoperative anal complications developed in 30% of the patients. Some had renewed lesions indicative of recurrences or exacerbation of a nonaffected area. Fistulization at the anal wound cavity was seen in one patient. One patient had a markedly slower formation of granular tissue after drainage of the abscesses and fistulas and a delay in wound healing in the sacral area after rectal extirpation. Intestinal resection is the suggested therapy for Crohn's disease with anal complications. Local surgical measures may endanger continence and is appropriate only in certain cases.

4475 OXALATE RENAL STONES AND GALLSTONES AFTER ILEAL RESECTION FOR CROHN'S DISEASE. (Fre.)

Capron, J. P.; Dupas, J. L.; Delamarre, J.; Joly, J. P.; Abourachid, H.; Lorriaux, A. (Centre Hospitalier Universitaire, 1, place Victor-Pauchet, F 80030 Amiens, Cedex, France). *Gastroenterol. Clin. Biol.* 1(2):165-169; 1977.

Oxalate renal stones and gallstones developed in a 64-yr-old man with Crohn's disease 15 yr after extensive (110 cm) ileal resection. Upon discovery of Crohn's disease, the patient was given a right hemicolectomy and a 30-cm resection of the ileum subsequent to an occlusive syndrome. He was well for 5 yr when symptoms of blocked intestinal transit recurred at which time he was subjected to an ileal resection (80 cm). Fifteen years later, the patient complained of right renal colic and hematuria. Radiography revealed large pyelocaliceal and gallbladder calculi, and surgical removal of the right renal calculi showed them to be composed of calcium oxalate. The patient had oxaluria, 60 mg/day, (normal, <25 mg) and fecal fat excretion was 50 g/day (normal, <6 g). Following 3 months of a low-oxalate and low-fat diet, steatorrhea was reduced to 6 g/day, but oxaluria was still elevated (80 mg/day). The effectiveness of such a diet in this disorder has not been demonstrated.

4476 RHEUMATIC MANIFESTATIONS OF CROHN'S DISEASE. A DISCUSSION OF THE RESULTS OF A NATIONAL SURVEY. (Fre.)

Deshayes, P.; Houdent, C.; Hecketsweiler, Ph. (Centre Hospitalier Universitaire, Hotel-Dieu, F 76038, Rouen CEDEX, France). *Rev. Rhum.* 43(10):541-551; 1976.

The results of a national survey of rheumatic manifestations of Crohn's disease (CD) in 102 patients are presented and the literature is reviewed. These rheumatic manifestations were classified as peripheral (47) or skeletal (55). In the 47 patients with peripheral rheumatism (28 women and 19 men), the diagnosis of CD was made anatomically in 21 and by radiological criteria only in 26. Clinically, these patients had arthralgias (15), regressive arthritis (25), and polyarthritis (7). Enteritis was closely associated with articular flare-ups. Other associated symptoms included erythema (14), conjunctivitis (4), and iritis (1). Tests for rheumatoid factor were always negative, but synovial fluid showed signs of inflammation in eight patients. Treatment with salicylates and anti-inflammatory agents benefitted 5/10 patients, and the effectiveness of corticoids was notable in 11 patients. Salapyrine had little effect on rheumatic symptoms. Of the 55 patients with skeletal manifestations, 32 had ankylosing spondylitis (equally distributed between the sexes). One-half of the cases of spondylitis were associated with ileocolitis; 21 patients (12 men and 9 women) presented with mono-, oligo-, or polyarticular evolution of arthralgia or arteritis. Less peripheral involvement was noted in forms with syndesmosis than in forms without. Extra-articular localizations were rarely seen and the evolution of spondylitis did not seem related to enteritis. A study of the histocompatibility antigen (HL-A) system revealed a positive test for the B 27 antigen in only one woman. In CD, ankylosing spondylitis and sacro-ileitis seem to be controlled by a genetic factor different from the HL-AB 27 marker.

4477 INDUCTION OF GRANULOMAS IN MICE BY INOCULATION OF TISSUE HOMOGENATES FROM PATIENTS WITH INFLAMMATORY BOWEL DISEASE AND SARCOIDOSIS.

(Eng.) Taub, R. N.; Sachar, D.; Janowitz, H.; Siltzbach, L. E. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Ann. N.Y. Acad. Sci.* 278:560-564; 1976.

Studies were carried out to determine if granuloma could be induced in CBA mice by the injection of homogenates of affected intestinal tissue from patients with inflammatory bowel disease and of homogenates of spleen from sarcoidosis patients. Mice inoculated with bowel homogenates from 13 patients with Crohn's disease and from 4 with ulcerative colitis developed epithelioid granulomas at the injection site. The granulomas were most numerous and florid in mice injected with actively inflamed granulomatous material. However, granulomas were also seen in mice inoculated with homogenates of tissue taken from the normal resection margin of the ileal or colonic specimen in six of nine patients. Homogenates taken from control patients undergoing resection for unrelated diseases produced granulomas in four of nine instances. The results indicate that material with potent granuloma-eliciting activity is present in the lymph nodes in some patients, and in affected intestinal tissues of all patients with ulcerative or granulomatous inflammatory bowel disease.

4478 CASE REPORT: AN UNUSUAL CASE OF CROHN'S DISEASE IN A WEST INDIAN CHILD. (Eng.)

Wallis, S. M.; Walker-Smith, J. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Acta. Paediatr. Scand.* 65(6):749-751; 1976.

4479 INFLAMMATORY BOWEL DISEASE IN WEST INDIANS.

(Eng.) O'Donoghue, D. P.; Clark, M. L. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Br. Med. J.* 2(6039):796; 1976.

4480 CROHN'S DISEASE, A MICROBIAL ETIOLOGY--A PRELIMINARY REPORT [Abstract]. (Eng.)

Westbroek, D. L.; Wensinck, F.; van Blankenstein, M.; van der Merwe, J. P.; Gorsira, M. C. B. (Univ. Hosp., Rotterdam, Netherlands). *Eur. Surg. Res.* 8(Suppl. 1):1-2; 1976.

4481 EVIDENCE FOR A TRANSMISSIBLE FACTOR IN CROHN'S DISEASE [Abstract]. (Eng.) Donnelly, B.; Delaney, P.; Healy, T. (U.C.D. Surgical Res. Lab., "Woodview," Belfield, Dublin 4, Ireland). *Eur. Surg. Res.* 8(Suppl. 1):3-4; 1976.

4482 STATE OF IMMUNITY IN CROHN'S DISEASE. (Fre.) Teillet, F.; Preel, J. L. (Hopital Louis-Mourier, F 92700 Colombes, France). *Arch. Fr. Mal. App. Dig.* 65(4):313-324; 1976.

See also, 3932, 4101, 4200, 4203, 4204, 4210, 4211.

MBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism an Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
µg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
µM	micromolar; micromole(s)
ma	milliampere(s)
mCi, µCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)

ml, µl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4483 LANGERHANS CELLS IN THE HUMAN OESOPHAGUS. (Eng.) Yassin, T. M. A.; Toner, P. G. (Glasgow Royal Infirmary, Glasgow, Scotland). *J. Anat.* 122(2):435-445; 1976.

The dendritic cells of Langerhans were observed by electron microscopy in the middle and superficial layers of 10 specimens of normal human esophageal mucosa. These cells did not occur in the basal layer or beneath the basal lamina. They exhibited typical Langerhans granules, but no desmosomes or tonofilaments. They were often irregular in outline with cytoplasmic protrusions that extended out from the perikaryon between the surrounding squamous cells. The cells usually had irregular indented nuclei, with a relatively pale cytoplasm contrasting with that of the adjacent squamous cells. The Langerhans cells were sometimes difficult to distinguish from intra-epithelial lymphocytes. Like Langerhans cells, these lymphocytes lacked tonofilaments and desmosomes, but they differed from typical Langerhans cells in that they did not have characteristic granules, their cytoplasmic organelles were less well organized, and their nuclear morphology had a more prominent heterochromatin component.

4484 HISTOCHEMICAL STUDIES OF MUCOSUBSTANCES AND LIPIDS IN NORMAL HUMAN OESOPHAGEAL EPITHELIUM. (Eng.) Hopwood, D.; Logan, K. R.; Coghill, G.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Histochem. J.* 9(2):153-161; 1977.

The carbohydrate mucosubstance and lipid histochemistry of normal human esophageal epithelium were investigated to establish a baseline for studying the diseased esophagus. Esophageal biopsies were obtained from 24 patients undergoing upper gastrointestinal endoscopy. The following previously identified layers were seen in the esophagus: the basal layer (a single layer of columnar cells), the prickle cell layer (several layers of polygonally shaped cells with numerous intercellular bridges), and the functional layer (several layers of cells, increasingly flattened towards the lumen). Neutral fat droplets, 1-2 μm in diameter, were present in all layers, the greatest number being in the functional layer cells. No unsaturated lipids or fatty acids were demonstrable. PAS and diastase digestion techniques revealed a large amount of glycogen in the cytoplasm of the prickle and functional cell layers. The intercellular space of the most superficial of the functional cell layer contained neutral and sialic acid-rich acid mucopolysaccharides. The authors suggest that these may be important in protecting the epithelium against physical and chemical trauma.

4485 ELECTRON HISTOCHEMISTRY OF MUCOSUBSTANCES IN NORMAL HUMAN RECTAL EPITHELIUM. (Eng.) Coghill, S. B.; Hopwood, D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Histochem. J.* 9(2):231-240; 1977.

The electron histochemistry of mucosubstances was studied in the normal rectal epithelium of 11 subjects to establish the pattern of reactivity of this tissue with the various tests available. The fuzzy coat, glycogen, lysosomes, Golgi apparatus, and theca were regularly stained with the periodic acid-chromic acid-methenamine silver technique. There was a gradient of increasing intensity of staining between the forming and maturing faces of the Golgi apparatus. The individual mucin packages that comprise the theca were not stained evenly, and often three discrete densities of staining were identified. Periodic acid oxidation followed by either thiosemicarbazide and osmium tetroxide or silver proteinate demonstrated the theca, lysosomes, and glycogen; the silver proteinate variant also outlined the Golgi apparatus, endoplasmic reticulum, and secretory vesicles in the goblet cells and the secretory granules of enterochromaffin cells. Phosphotungstic acid staining gave a distribution of mucosubstances similar to that revealed by the oxidation techniques. For demonstrating intracellular mucosubstances, the periodic acid-chromic acid-methenamine silver and phosphotungstic acid techniques were the most consistent. Glycogen was demonstrable by the periodate oxidation methods and the complex cyanide technique. Alcian blue, ruthenium red, and concanavalin A stained components on the cell surfaces only. The distribution of acid and neutral mucosubstances on the cell surface and among the various normal epithelial components revealed in this study will serve as a baseline for comparison with diseased tissue.

4486 BRUSH BORDER MOTILITY: MICROVILLAR CONTRACTION IN TRITON-TREATED BRUSH BORDERS ISOLATED FROM INTESTINAL EPITHELIUM. (Eng.) Mooseker, M. S. (Dept. Anatomy, Harvard Medical Sch., Boston, MA 02115). *J. Cell Biol.* 71(2):417-433; 1976.

A model for microvillar contraction in the brush borders of chicken, rat, rabbit, and pig intestinal epithelial cells is proposed based on light and electron microscopy of contractions induced *in vitro*. The addition of calcium and ATP to isolated brush borders pretreated with Triton X-100 resulted in retraction of the microfilament bundles into and through the terminal web. Biochemical analysis showed the main protein of the brush border to be actin, but proteins with properties similar to those of myosin (200,000 daltons), tropomyosin (30,000 daltons), and a z-band protein, α-actin (95,000 daltons), were also detected. A potassium-EDTA ATPase activity of 0.02 μmol phosphate/mg/min (22 C), characteristic of vertebrate myosin ATPase, was found. These results indicate that microvillar contraction is the result of an actomyosin interaction. A model for the interaction of actin and myosin in the microvilli and the relationship of the two substances to the terminal web is compared with another recently proposed model.

4487 CELL LOSS FROM NORMAL AND STRESSED GASTRIC MUCOSAE OF THE RAT. AN ULTRASTRUCTURAL ANALYSIS.

(Eng.) Harding, R. K.; Morris, G. P. (Queen's Univ., Kingston, Ontario, Canada K7L 3N6). *Gastroenterology* 72(5):856-863; 1977.

Scanning and transmission electron microscopy were used to study mechanisms of surface epithelial cell (SEC) loss from the gastric mucosae of normal, fasted Charles River rats and of rats exposed to acute stressors. In fasted control animals, SEC loss occurred primarily via extrusion of individual interfoveolar cells and only rarely by degeneration *in situ*. Each extruding cell was surrounded by a rosette-like configuration of adjacent, encroaching SEC. Mucosal integrity was maintained. Short-term exposure to acute stressors (free operant avoidance training, serosal application of acetic acid, hemorrhagic shock, or mucosal exposure to acidic solutions of acetylsalicylic acid) resulted in an increase in the incidence of extrusive cell loss. Continued exposure to stressors also increased the incidence of degeneration *in situ* of isolated SEC or groups of SEC. Extrusion provides a mechanism for the necessary removal of gastric SEC. Acute stress may override or exhaust the extrusive mode, producing, via ischemia or surface diffusion of cytotoxic agents, SEC degeneration *in situ* and breaks in the mucosal barrier.

4488 MORPHOMETRIC STUDIES OF THE CELLS LINING THE RAT STOMACH IN CHRONIC ALCOHOLISM.

(Ger.) Al-Abadi, H.; Dumke, K.; Donhuijsen, K.; Niedobitek, F. (Stadt. Auguste-Viktoria-Krankenhaus, Pathol. Institut, Rubensstrasse 125, D-1000 Berlin 41, W. Germany). *Z. Gastroenterol.* 15(1): 1-8; 1977.

The effect of 15% alcohol, given *ad libitum* for 8 days, 2, 4, 8, and 12 weeks, on the morphometry of the parietal cells lining the stomach was studied in 84 male Wistar rats. The rats were divided into 12 groups of 5 rats; 24 additional rats served as controls. The parietal cells were stained with congo red for histological sectioning, and with a modified Papanicolaou's stain for cytological examination. The cell and nuclear surface as well as the nucleus-plasma ratio were measured using an integrated smear disc and a microvideomet. Both histological and cytological preparations showed a significant increase (43%) in parietal cell surface during alcohol treatment. The cytoplasmic surface increased continuously up to the 8th week. However, alcohol application for 12 weeks resulted in a decrease (33%) in the cytoplasmic surface. The nuclear surface increased by 10% following an 8-week alcohol treatment, but decreased by 7.5% by the 12th week of treatment. The nucleus-plasma ratio was dependent on the increase in the plasma surface and, therefore, showed a 36% decrease. In all cytological preparations, the microvideomet technique produced larger results for the total cell surface than the integrated smear disc; the size of the nucleus was smaller with the microvideomet technique.

4489 IDENTIFICATION OF GASTRIN-SECRETING CELL AND CHOLECYSTOKININ-SECRETING CELLS IN THE GASTROINTESTINAL TRACT OF THE HUMAN FETUS AND ADULT MAN.

(Eng.) Dubois, P. M.; Paulin, C.; Chayvialle, J. A. (Laboratoire d'Histologie et Embryologie, U.E.R. Medicale, Lyon Sud-Ouest, B.P. no. 12, F-69600 Oullins, France). *Cell Tissue Res* 175(3):351-356; 1976.

Gastrin- and cholecystokinin (CCK)-containing cell were detected using anti-gastrin and anti-CCK sera in the gastrointestinal tracts of 5- to 24-week-ol human fetuses and premature infants, and in the stomach and duodenum of eight adult patients with normal gastroduodenal endoscopy. In adult man and in the 20-week-old fetus, the immunocytological reaction was positive in the antrum only with anti gastrin serum. Both gastrin and CCK were present in the juxtapyloric region. Outside the juxtapylo region, the endocrine cells were stained with the anti-gastrin serum as well as with the anti-CCK serum. No cells were stained with the anti-gastri serum incubated with CCK at a concentration equal to 1 mg/ml of nondiluted serum. Adding gastrin to the anti-CCK serum did not alter the immunocytological reaction due to this serum. It may be considered that the anti-gastrin serum incubated with CCK was rendered completely specific for gastrin. No cross reaction took place between the anti-CCK serum and gastrin. Heterologous antigens (secreti somatostatin, glucagon, insulin, serotonin, and histamine) did not inhibit the immunocytochemical reaction due to each antiserum. Gastrin cells wer first seen in the fetal duodenum as early as 10 weeks of age. Before 14 weeks of age, no gastrin-containing cells were found in the antrum. The fi CCK cells were seen in the small intestine of the 10-week-old fetus. The data demonstrate that gast cells and CCK cells may be identified in the fetus and in adults by a simple technique that can be us in diseases where disorders of CCK or gastrin meta olism are present.

4490 THE PIT CELL: DESCRIPTION OF A NEW TYPE OF CELL OCCURRING IN RAT LIVER SINUSOIDS AND PERIPHERAL BLOOD.

(Eng.) Wisse, E.; van't Noordende, J. M.; van der Meulen, J.; Daems, W. Th (Lab. Electron Microscopy, Univ. Leiden, Rijnsburg erweg 10, Leiden, Netherlands). *Cell. Tissue Res.* 173(4):423-435; 1976.

A new type of cell, called the pit cell, was obser in liver sinusoids and the peripheral blood of mal Wistar rats by electron microscopy. Pit cells con tain highly characteristic granules with electron dense inclusions, are situated in the wall of rat liver sinusoids, and have hyaloplasmic pseudopodia intermingling with the microvilli of the parenchym cells. The characteristic granules are mainly sit uated at one side of the nucleus, with the other side showing organelle-free hyaloplasm. Pit cells are also found in portal tracts and in granuloma-like cellular aggregates. They also occur in the buffy coat of rat peripheral blood but differ from those in liver sinusoids in terms of the number of granules per cell section (6.6 ± 2.5 versus 12.9 ± 4.9, resp.; $p<0.05$), the diameter of the dense inclusions (0.43 ± 0.10 μ versus 0.28 ± 0.05 μ, resp.; $p<0.05$); and the diameter of their mitochondria (0.30 ± 0.04 μ versus 0.41 ± 0.08 μ, resp.; $p<0.05$). Pit cells can be regarded as regular inhabitants of the sinusoidal wall and therefore belong to the series of sinusoidal cells, i.e., the endothelial, Kupffer, and fat-storing cells. Pit cells do not phagocytize and do not react to a number of experimental conditions to which endothelial and Kupffer cells react. No signs of endocytotic activity of pit cells were seen after the i.v. injection of Thorotrast, Latex, Zymosan, or horseradish peroxidase. A single example of pit cell mitosis was found in normal liver. The function of pit cells remains obscure, but an endocrine function is suggested by the morphology of their highly characteristic granules.

4491 THE SURFACE CHARACTERISTICS OF THE PLASMA MEMBRANE OF THE EXOCRINE PANCREAS. (Eng.) Katsuyama, T.; Spicer, S. S. (Dept. Pathology, Shinshu Univ., Matsumoto, Japan). *Am. J. Anat.* 148(4): 535-554; 1977.

To elucidate functional specializations related to fluid and electrolyte transport, regional differentiation of the plasma membrane and related structures of the rat exocrine pancreas were studied ultrastructurally and cytochemically. Fixation with an osmium tetroxide-silver acetate solution produced abundant fine precipitates on the luminal and basal surface of the centroacinar but not the acinar cells. Dialyzed iron (DI) staining revealed the heaviest concentration of anionic sites on the luminal plasma membrane of the acinar cells, including the surface of both the intercellular canaliculi and the main lumen. The reactive sites on the apical acinar plasmalemma appeared to consist of discrete globules. DI-reactivity of the lateral basal membranes was most prominent in the centroacinar cells and essentially absent in the acinar cells but was weak relative to that of the acinar-cell apical plasmalemma. The lamina lucida of the basement membrane of the duct stained with DI, but that of basement membrane under acinar cells did not. Sialidase digestion prior to DI staining abolished the staining of plasma membranes. These results indicate that duct epithelial cells, including most prominently the centroacinar cells, are chiefly responsible for electrolyte and fluid transport.

4492 IONIC COMPONENTS OF SECRETORY CELL SURFACES IN RELATION TO SECRETORY FUNCTION. (Eng.) Katsuyama, T.; Spicer, S. S. (Medical Univ. South Carolina, 80 Barre St., Charleston, SC 29401). *Histochem. J.* 9(4):467-493; 1977.

Rat pancreas was examined by ultrastructural cytochemical methods to localize cations and anions, as well as polyanions and sulfated mucosubstances. Antimonate-precipitable cation was abundant between pancreatic acinar cells and at the base of the centroacinar and other duct epithelial cells. Precipitates of nuclear heterochromatin appeared lighter, whereas those of mitochondria and cytoplasm were more coarse and more conspicuous in acinar than duct cells. Stimulation with synthetic secretin (0.1 U, i.v.) diminished nuclear antimonate reactivity and the precipitation at the basement membrane of centroacinar cells. At a higher dose (1.0), secretin selectively eliminated precipitation between and below centroacinar and other duct cells and increased the amount of antimonate-reactive cation in centroacinar cells and the acinar lumens. Pancreozymin stimulation (1.0 U, i.v.) eliminated antimonate-precipitable cations between acinar cells and, to a much lesser extent, those between duct cells and increased cytoplasmic precipitates on the granular reticulum of acinar cells. Silver-precipitable anions were localized on the luminal surface of the apical plasmalemma and the outer surface of the laterobasal plasmalemma of centroacinar cells but not on acinar cell surfaces. Silver precipitates also occurred on junctional complexes of acinar and duct epithelial cells, at tight junctions of acinar cells, and on the inner face of the lateral plasmalemma of acinar cells. Dialyzed iron staining demonstrated the most number of sites of acid mucosubstance on the luminal surface of the plasmalemma of acinar cells. Lateral and basal plasmalemmas of centroacinar and more distal duct cells stained lightly with dialyzed iron, but those of acinar cells did not. Dialyzed iron visualized acid mucosubstances in the lamina lucida of the basement membrane of duct but not of acinar cells. Dialyzed iron staining of the plasma membranes succumbed to prior sialidase treatment, whereas that of basement membrane resisted digestion. High iron diamine staining demonstrated sulfated mucosubstance in the lamina lucida of the duct basement membrane exclusively. The cytochemical results implicate centroacinar cells as primarily responsible for contributing fluid and electrolytes to pancreatic secretion.

4493 REGULATION OF THE GROWTH OF THE GASTROINTESTINAL MUCOSA [Abstract]. (Eng.) Crean, G. P. (Gastrointestinal Centre, Glasgow, Scotland). *Rend. Gastroenterol.* 9(1):72-73; 1977.

4494 GASTRIC MUCUS AND MUCOSAL INJURY. (Eng.) Glass, G. B. J. (New York Medical Coll., New York, NY). *Mater. Med. Pol.* 8(2):177-185; 1976.

4495 PROLIFERATION KINETICS OF GASTRIC SURFACE EPITHELIUM IN NORMAL AND DISEASED MUCOSA [Abstract]. (Eng.) Castrup, H. J. (Kliniken der Universitat Gottingen, Klinik und Poliklinik fur Allgemeinchirurgie, Gottingen, W. Germany). *Rend. Gastroenterol.* 9(1):76-77; 1977.

4496 QUANTITATION OF GASTRIN CELLS IN ENDOSCOPIC ANTRAL BIOPSIES BY IMMUNOFLUORESCENCE [Abstract]. (Eng.) Pera, A.; Crivelli, O.; Ferrari, A.; Babando, G.; Verme, G. (Divisione di Gastroenterologia dell'Ospedale Mauriziano Umberto I, Torino, Italy). *Rend. Gastroenterol.* 9(1):49-50; 1977.

See also, 4536, 4575, 4576, 4600, 4678, 4685, 4689, 4708, 4709, 4710, 4733, 4815, 4849, 4867, 4899, 4912, 4960, 5044, 5094, 5178.

4497 CONJUGATED DIHYDROXY BILE SALT INHIBITION OF GLUCOSE INFLUX IN RAT JEJUNUM IN VITRO.

(Eng.) Feldman, E. B.; Watt, R.; Feldman, D. S. (Medical Coll. Georgia, Augusta, GA 30902). *Am. J. Dig. Dis.* 22(5):415-418; 1977.

The effects of bile salts on intestinal glucose transfer and the effects of chemical and surgical bile diversion were studied in male rats. Radiolabeled glucose influx into the jejunum *in vitro* was studied in buffer and compared to taurodeoxycholate, taurochenodeoxycholate, taurocholate, and deoxycholate. The jejunum was obtained from intact, bile-diverted, and colestipol-treated rats and after x-irradiation. In untreated saline intubated or sham-operated rats, jejunal glucose influx in buffer alone was the same and did not change in the presence of the bile salts. Production of a complete bile fistula resulted in a 38% increase ($p<0.01$) of glucose influx from buffer. Addition of bile salts to jejunal segments from these bile-diverted rats resulted in a significant 40% decrease in glucose influx with conjugated dihydroxy sodium taurodeoxycholate (TDC, $0.02>p>0.01$). Because of the large standard error, the decreased glucose influx with sodium taurochenodeoxycholate was not statistically significant ($p=0.24$). Glucose influx rates with deoxycholate and conjugated trihydroxy sodium taurocholate did not differ significantly from the values in buffer. Jejunal glucose influx in colestipol-treated rats was one-third lower than that of intact untreated rats ($p<0.001$) and half that of bile fistula rats ($p<0.001$). However, the addition of TDC ($p<0.001$) and TCDC ($0.05>p>0.02$) to colestipol-treated rat jejunum significantly reduced glucose influx still further. Abdominal x-irradiation significantly decreased jejunal glucose influx from buffer in intact untreated ($p<0.001$), bile fistula ($0.05>p>0.02$), and colestipol-treated ($p<0.001$) rats. The data suggest that normal exposure to bile chronically inhibits jejunal glucose transport and that dihydroxy bile salts are responsible for this effect. They do not provide an explanation for the role of bile in the intestinal radiation syndrome.

4498 ACUTE AND CHRONIC EFFECTS OF ETHANOL ON FLUID TRANSPORT IN THE HUMAN SMALL INTESTINE.

(Eng.) Mekhjian, H. S.; May, E. S. (N-937 Univ. Hosp., The Ohio State Univ., 410 West 10th Ave., Columbus, OH 43210). *Gastroenterology* 72(6): 1280-1286; 1977.

The effect of acute and chronic administration of ethanol on jejunal and ileal water and electrolyte transport was studied in 13 healthy volunteers by the triple lumen intestinal perfusion technique. The acute perfusion of a glucose-free electrolyte solution containing 2-10 g/100 ml of ethanol in the jejunum or ileum did not change sodium or water transport. In contrast, the administration of a folate-deficient diet and ethanol for 2 weeks produced a marked reduction in sodium and water absorption or a small net secretion (control: $H_2O=0.91 \pm 0.06$ ml/min, Na=130 ± 8 µEq/min/30 cm intestine versus $H_2O=-0.13 \pm 0.14$ ml/min, Na=-20 ± 29 µEq/min/30 cm, $p<0.001$). These changes were not accompanied by a reduction in serum folate levels. The administration of ethanol with a folate-supplemente diet also produced significant changes in sodium an water transport (control: $H_2O=1.33 \pm 0.2$ ml/min, Na=185 ± 34 µEq/min/30 cm intestine versus $H_2O=0.48 \pm 0.17$ ml/min, Na=65 ± 16 µEq/min/30 cm intestine, $p<0.05$). It appears that the diarrhea seen in chronic alcoholics can be explained in part by the effect of ethanol on intestinal sodium transpor without any accompanying changes in serum folate levels.

4499 EFFECT OF GLYCOCHENODEOXYCHOLIC ACID ON UNIDIRECTIONAL TRANSEPITHELIAL FLUXES OF ELECTROLYTES IN THE PERFUSED HUMAN ILEUM.

(Eng.) Oddsson, E.; Rask-Madsen, J.; Krag, E. (Herlev Hosp Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(2):199-204; 1977.

Perfusion studies of the terminal ileum were performed in 10 healthy volunteers to define the influence of a dihydroxy bile acid, glycochenodeoxy cholic acid (GCDC, 2.5 mM), on the mechanisms of electrolyte transport. GCDC caused significant decreases in water, sodium, potassium, and chloride absorption or increases in their secretion ($p<0.01$) but no change in bicarbonate transport. Net ion movement showed a linear relationship to net water movement, and the ion concentration in the fluid absorbed or secreted was identical to the ion concentration of the perfusate. During control perfusion, sodium was absorbed against a small chemical and a substantial electrical gradient, and chloride was absorbed against a chemical, but along an electrical, gradient. During GCDC perfusi sodium was secreted along a chemical and electrical gradient. Potassium secretion was enhanced, but the electrochemical gradient was unchanged. Chlori was secreted along a chemical, but against an electrical, gradient. In the control periods, the intestinal lumen was 10-20 mV negative relative to blood with a median value of -16 mV. GCDC did not influence the potential difference significantly. GCDC decreased the mucosa to serosa flux of chlorid The results support the existence of an active mechanism for sodium and chloride transfer, and a model for the GCDC effect is proposed.

4500 EFFECTS OF SYNTHETIC HUMAN GASTRIN I ON MOVEMENTS OF WATER, ELECTROLYTES, AND GLUCOSE ACROSS THE HUMAN SMALL INTESTINE.

(Eng.) Modigliani, R.; Mary, J. Y.; Bernier, J. J. (Hopita Saint-Lazare, 107 rue du Faubourg Saint Denis, 75010 Paris, France). *Gastroenterology* 71(6):978-984; 1976.

The effect of graded doses (0.125, 0.500, 1.00, and 2.00 µg/kg/hr) of i.v. synthetic human gastrin I (SHG) on jejunal transport of water, electrolytes, and glucose from a glucose-saline solution (soluti II) was studied in 12 healthy volunteers, using an intestinal perfusion technique with a proximal occluding balloon. SHG (≥0.500 µg/kg/hr) significant reduced water and electrolyte absorption; this effect was linearly related to the dose and reached 40-60% of basal absorption (and only 10% for glucose) with the highest dose. Insorption of sodium and water were significantly decreased by SHG. In an additional nine subjects, no effect of SHG (2 μg/kg/hr) was found on jejunal absorption from a mannitol-saline solution (solution I) and on ileal absorption from solutions I and II; in five additional subjects, SHG did not decrease jejunal transit time of intraluminal fluid. There was no increase in serum thyrocalcitonin during SHG infusion. It is proposed that SHG selectively depresses the glucose-stimulated sodium transport as suggested by the reduction of the rate of net sodium absorption per micromole of glucose absorbed during SHG infusion.

4501 EFFECTS OF SALINE INFUSION AND ACUTE METABOLIC ACIDOSIS AND ALKALOSIS ON WATER AND ELECTROLYTE TRANSPORT IN THE HUMAN COLON.

(Eng.) Crepeau, R.; Romeder, J. M.; Devroede, G.; Plante, G. E. (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada). *Can. J. Physiol. Pharmacol.* 55(1): 13-20; 1977.

The respective contributions of the kidney and the colon to acid-base and electrolyte balance were studied in eight healthy male volunteers who underwent simultaneous renal clearance studies, and colonic perfusion with a 0.9% saline or 7.2% mannitol solution, during metabolic alkalosis and acidosis, extracellular volume expansion, and control conditions. These acid-base conditions had no influence on electrolyte transport in the colon. In the urine, preferential loss of chloride over sodium averaged 81, 143 ($p<0.001$), and 141 ($p<0.05$) μEq/min, during control, metabolic acidosis, and extracellular volume expansion conditions, resp. During alkalosis, more sodium than chloride was lost (146 μEq/min; $p<0.001$). Colonic pH averaged 7.41 during saline and 6.75 ($p<0.005$) during mannitol perfusion. Titratable acid was not produced in the colon during saline perfusion, and averaged 18 μEq/min during mannitol perfusion. Urinary titratable acid increased from 19 to 25 μEq/min ($p<0.01$) during volume expansion. With saline perfusion, bicarbonate secretion rate in the colon rose from 249 μEq/min during control conditions to 289 μEq/min during metabolic alkalosis ($p<0.05$). More bicarbonate was excreted in the urine during alkalosis when mannitol was introduced in the colon (243 μEq/min) than when saline was perfused (152 μEq/min; $p<0.05$). This study indicates that the response of the human colon is trivial compared with that of the kidney during acute changes in acid-base balance.

4502 UPTAKE OF K^+ BY FROG GASTRIC MUCOSA FROM SUBMUCOSAL SIDE AND ACID SECRETORY RATE.

(Eng.) Takeguchi, N.; Horikoshi, I.; Hattori, M. (Faculty Pharmaceutical Sciences, Univ. Toyama, Toyama, Japan). *Am. J. Physiol.* 232(3):E294-E297; 1977.

The dependence of the K^+ gastric mucosal content, transmucosal potential difference, and acid secretory rate on the K^+ concentration in the submucosal solution was investigated in frogs (*Rana catesbeiana*) The K^+ content (K^+) in gastric mucosa was measured as a function of the submucosal K^+ concentration ($[K^+{}_{sm}]$) in the absence of K^+ on the mucosal side. The (K^+) in HCO_3 buffer with 95% O_2-5% CO_2 gas showed that the removal of external K^+ induced a 27% loss from the control value of 5 mM $K^+{}_{sm}$, that there was no linear relation between (K^+) and $[K^+{}_{sm}]$, and that the change in the (K^+) versus $[K^+_{sm}]$ was hyperbolic. This indicates that there are two different types of K^+ in the mucosa: bound and free.

4503 THE RELATIVE TRANSFER RATES FOR SODIUM AND XENON FROM GUT LUMEN TO PLASMA IN MAN.

(Eng.) Love, A. H. G.; Chen, L. C.; Reeve, J.; Veall, N. (Dept. Medicine, Queen's Univ. Belfast, Belfast, Northern Ireland). *Clin. Sci. Mol. Med.* 52(3):249-254; 1977.

The unidirectional transfer rate of sodium from gut lumen to plasma was compared with that of the tracer ^{133}Xe to test the hypothesis that mucosal blood flow to the small intestine may be the dominant rate-limiting factor that determines the unidirectional transfer of sodium from gut lumen to plasma. A whole-gut perfusion technique was used. The calculated transit-time spectra for sodium and xenon across the gut mucosa did not differ significantly either in mean transit time (6.05 and 6.60 min, resp.) or, for the first 15 min, in shape. The results support the hypothesis that the rate of transfer of sodium from the small intestinal lumen is limited by blood flow, and that this reduction in cholera patients reflects a reduction in mucosal blood flow. There is increasing evidence that suggests that the specific effect of cholera toxin is to promote a secretory mechanism. Therefore, the reduction of mucosal blood flow in cholera patients would not be of primary importance in the pathogenesis of cholera diarrhea.

4504 ELECTRICAL POTENTIAL PROFILE IN RABBIT ILEUM: ROLE OF RHEOGENIC Na TRANSPORT.

(Eng.) Rose, R. C.; Nahrwold, D. L.; Koch, M. J. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Coll. Medicine, Hershey, PA 17033). *Am. J. Physiol.* 232(1):E5-E12; 1977.

The electrical potential profile of rabbit ileum was investigated *in vitro* by a microelectrode technique to determine if this profile is consistent with rheogenic ion transport. The transmural electrical potential difference (PD), designated ψms, was immediately reduced by 60% upon cooling the tissue from 37 to 7 C; the PD across the mucosal membrane (transmucosal PD, ψmc) was simultaneously reduced by 37%. These electrical changes could not be attributed to alterations in either transmembrane ion concentration gradients or total tissue conductance. The ψmc and ψms may have substantial values even after the concentration gradients of Na and K across the cell membrane are eliminated, provided that active transport mechanisms are still operative. Conversely, in the presence of approximately normal transmembrane ion concentration gradients, but when active transport mechanisms have been inhibited, ψmc is reduced by 45% and ψms is zero. These observations are consistent with a model of electrolyte transport in which ψms and the normal transmembrane cation concentration gradients are established by rheogenic active transport of Na out of the cell. The ψmc is generated both by rheogenic active Na transport and by cation concentration gradients that exist across the cell membrane.

4505 ACTIVE SODIUM TRANSPORT AND THE ELECTROPHYSIOLOGY OF RABBIT COLON. (Eng.)

Schultz, S. G.; Frizzell, R. A.; Nellans, H. N. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Membrane Biol.* 33(3/4):351-384; 1977.

Using microelectrode techniques, the electrophysiologic properties of rabbit colonic epithelial cells were investigated. Under open-circuit conditions, the transepithelial electrical potential difference (PD) averaged 20 mV, serosa positive, and the intracellular electrical potential (ψ_{mc}) averaged -32 mV, cell interior negative with respect to the mucosal solution; under short-circuit conditions, ψ_{mc} averaged -46 mV. The addition of amiloride to the mucosal solution abolished the transepithelial PD and active Na transport, and ψ_{mc} was hyperpolarized to an average value of -53 mV. These results indicate that Na entry into the mucosal cell is a conductive process that normally depolarizes ψ_{mc}. The data were interpreted using a double-membrane equivalent electrical circuit model of the "active Na transport pathway" involving two voltage-independent electromotive forces (emf's) and two voltage-independent resistances arrayed in series. The observations are consistent with the notions that the emf's and resistances across the mucosal and basolateral membranes are determined predominantly by the emf (64 mV) and resistance of the Na entry process and the emf (53 mV) and resistance of the process responsible for active Na extrusion across the basolateral membranes. That is, the electrophysiological properties of the cell appear to be determined solely by the properties and processes responsible for transcellular active Na transport. The emf of Na entry is consistent with the proposal that the Na activity in the intracellular transport pool is approximately one-tenth that in the mucosal solution, or about 14 mM. In the presence of amiloride, the transcellular conductance is essentially abolished, and the total tissue conductance is the result of ionic diffusion through paracellular pathways. The negative intracellular potential is due primarily to the presence of a low-resistance paracellular "shunt" pathway that permits electrical coupling between the emf at the basolateral membrane and the potential difference across the mucosal membrane; in the absence of this shunt, the "well-type" electrical potential profile characteristic of rabbit colonic cells would be converted into a "staircase-type" profile similar to those reported for frog skin and toad urinary bladder.

4506 TRANSFER OF SODIUM AND WATER THROUGH ISOLATED RAT COLONIC MUCOSA UNDER THE INFLUENCE OF DEOXYCHOLATE AND OXYPHENISATIN. (Eng.)

Wanitschke, R.; Nell, G.; Rummel, W.; Specht, W. (I. Medizinische Klinik, Universitat Mainz, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Naunyn Schmiedeberg's Arch. Pharmacol.* 297(2):185-190; 19

The mechanism by which oxyphenisatin (OP) and bile acids inhibit intestinal water and electrolyte absorption and induce net fluid and electrolyte transfer into the lumen was studied in an everted sac preparation of stripped rat colon. OP (10^{-5} M mucosal side) and deoxycholate (3×10^{-4} M, mucosa side) completely blocked net water and sodium absorption. Net movements from the serosal to the mucosal side were not induced by higher concentrations of the drugs. Unidirectional sodium movemen in both directions were increased by OP and deoxycholate. Sodium flux from mucosa to serosa was increased from a control of 2.40 ± 0.15 to 3.05 ± 0.20 mEq/hr/g by deoxycholate and to 3.70 ± 0.18 mEq/hr/g by OP; sodium flux in the opposite direct was increased from a control of 1.08 ± 0.32 to 3.1 ± 0.35 mEq/hr/g by deoxycholate and to 3.65 ± 0.45 mEq/hr/g by OP. The effect of deoxycholate on the sodium flux from the serosal to the mucosal side w reversible. The potassium content of the mucosal epithelium was unchanged by the two agents. The integrity of the epithelium, as judged by light microscopy, was not disturbed by either drug under the experimental conditions. It is concluded that deoxycholate and OP do not interfere with active transport mechanism, but increase the permeability of the epithelium to sodium.

4507 EFFECTS OF GLUCAGON ON CANINE INTESTINA SODIUM AND WATER FLUXES AND REGIONAL BLOOD FLOW. (Eng.)

MacFerran, S. N.; Mailman, D (Biology Dept., Univ. Houston, Houston, TX 77004) *J. Physiol. (London)* 266(1):1-12; 1977.

The possibility that glucagon alters gut absorpti by altering capillary blood pressure through its vasodilator activity was examined in dogs. Glucagon (0.05 or 0.5 µg/kg/min) was infused into a mesenteric artery of an ileal segment, from which transport was measured (direct infusion), or into a mesenteric artery of an adjacent non-perfused segment (indirect infusion). Unidirectional Na and H_2O fluxes, arterial and mesenteric vein pressures, and total and absorptive site blood flows were measured. Direct glucagon infusion increased the absorptive and secretory fluxes of Na and H_2O and absorptive site blood flow, and decreased absorptive site resistance and arterial and mesenteric vein pressure. Indirect glucagon infusion had the opposite effects. Neither the direct arterial infusion of histamine (0.1-53 µg/kg/min) nor the i.v. infusion of glucose (0.2 g/min), insulin (0.1 U/kg), or glucose plus insulin mimicked the effects of glucagon. The unidirectional secretory and absorptive fluxes of both Na and H_2O were linearly related to the calculated capillary pressure during glucagon infusion. It is concluded that the effects of glucagon on gut transport are due to effects exerted through the cardiovascular system.

4508 SUCROSE ABSORPTION BY THE RAT SMALL INTESTINE IN VIVO AND IN VITRO. (Eng.)

Davidson, R. E.; Leese, H. J. (Dept. Biology, Univ. York, York YO1 5DD, England). *J. Physiol. (London)* 267(1):237-248; 1977.

Previous evidence that the fructose derived from sucrose elevates plasma triglyceride levels and may predispose individuals to ischemic heart disease and obesity led to studies in which the absorption of glucose and of fructose derived from sucrose was investigated using *in vitro* and *in vivo* loops of the Wistar rat jejunum. At low sucrose concentrations (1 and 10 mM) glucose appeared in the serosal compartment of the *in vitro* preparation at a faster rate than did fructose, but at high sucrose concentrations (50 and 100 mM) the rates of serosal transfer of the two sugars were similar. Glucose and fructose appeared in the mucosal compartment, with the rate of fructose appearance exceeding that of glucose, at all the sucrose concentrations studied. Phlorizin (5×10^{-5} M) added to the *in vitro* preparation abolished the serosal transfer of glucose derived from 50 mM sucrose, and reduced that of fructose by 75%. In the absence of sodium ions, the *in vitro* preparation failed to transfer glucose and fructose derived from 50 mM sucrose into the serosal compartment. Glucose was actively accumulated in the whole gut wall of the *in vivo* preparation to concentrations higher than those in the plasma at 50 and 100 mM, but not at 10 mM sucrose concentrations. Fructose was also actively accumulated to about half the extent of glucose, but reached tissue concentrations greater than those in the plasma at each sucrose concentration. The whole-wall concentrations of glucose and fructose derived from sucrose added to the lumen continued to rise when the blood supply to the *in vivo* preparation was terminated. No increase in the *in vivo* whole-wall concentrations of glucose and fructose were detected when sucrose was added to the lumen together with concentrations of glucose sufficient to saturate the monosaccharide transport systems. The results suggest that disaccharide hydrolysis and the resulting hexose transfer are sequential and separate events.

4509 PANCREATIC EXTRACT AND THE INTESTINAL UPTAKE OF VITAMIN B_{12}. II. INHIBITORY EFFECT OF TRYPSIN AND TRYPSINOGEN. (Eng.) von der Lippe, G.; Andersen, K. J.; Morkrid, L.; Schjonsby, H. (Haukeland sykehus, N-5016 Bergen, Norway). *Scand. J. Gastroenterol.* 12(2):177-182; 1977.

The pancreatic factors responsible for the ability of pancreatic extract, rat pancreatic juice, and human duodenal juice to inhibit the uptake of intrinsic factor (IF)-bound vitamin B_{12} by perfused rat intestinal segments were investigated. Neither nonradioactive vitamin B_{12} nor nonpancreatic protein reduced $^{57}CoB_{12}$ uptake ($p>0.5$ and $p>0.1$, resp.) by small intestinal segments. Trypsin (1.5 mg/ml) and trypsinogen (5.0 mg/ml) significantly reduced the mean intestinal uptake of $^{57}CoB_{12}$-IF, whereas chymotrypsin (20.0 mg/ml) had no significant effect. The uptake after perfusion with only 1.5 mg/ml trypsinogen (21.2 ± 3.3 pg $^{57}CoB_{12}$/cm intestine) was not significantly different from the control uptake (21.7 ± 3.9 pg/cm). When soybean trypsin inhibitor was added to pancreatic extract, the mean intestinal uptake (18.6 ± 1.0 pg/cm) was significantly lower than the control uptake (29.1 ± 2.7 pg/cm, $p<0.01$). Detrypsinized pancreatic extract reduced the uptake from 26.2 ± 4.3 (control) to 15.5 ± 2.1 pg/cm, ($p<0.02$). When trypsin was inactivated by soybean trypsin inhibitor, the mean intestinal uptake was not significantly different from the control. The results suggest that the pancreatic extract contains several factors capable of inhibiting the intestinal uptake of IF-bound vitamin B_{12}.

4510 PANCREATIC EXTRACT AND THE INTESTINAL UPTAKE OF VITAMIN B_{12}. III. STIMULATORY EFFECT IN THE PRESENCE OF A NON-INTRINSIC FACTOR VITAMIN B_{12} BINDER. (Eng.) von der Lippe, G.; Andersen, K. J.; Schjonsby, H. (Haukeland sykehus, N-5016 Bergen, Norway). *Scand. J. Gastroenterol.* 12(2):183-187; 1977.

The mechanism by which pancreatic extract (PE) corrects the malabsorption of vitamin B_{12} in chronic pancreatic insufficiency (CPI) was investigated in male Wistar rats. The p.o. administration of PE (100 mg) had no effect on the pH in the proximal, middle, or distal small intestine. PE did not stimulate the uptake of unbound $^{57}CoB_{12}$ by perfused rat intestinal segments. Preincubation of $^{57}CoB_{12}$ bound to intrinsic factor ($^{57}CoB_{12}$-IF) with a non-IF B_{12}-binder from human saliva (R-binder) reduced the intestinal uptake of $^{57}CoB_{12}$ from 18.5 ± 3.4 pg/cm intestine to 7.8 ± 1.6 pg/cm ($p<0.02$). PE abolished this inhibitory effect ($p<0.05$). The results indicate that PE corrects the malabsorption of vitamin B_{12} in chronic pancreatic insufficiency by an effect on non-IF B_{12} binders.

4511 VARIATIONS IN INTESTINAL ABSORPTION. THE AMBIENT: ORAL XYLOSE TESTS IN CHILDREN. (Ita.) Ciampolini, M.; Adami-Lami Conti, C.; Muzzarelli, D. (Pediatric Clinic, Univ. Florence, Florence, Italy). *Minerva Gastroenterol.* 23(1):1-4; 1977.

4512 IRON ABSORPTION IN MALNUTRITION--EXPERIMENTAL ASSAY. (Por.) Goncalves, A. L.; Faggioni, L. G.; Jorge, S. M.; Granzotti, J. A.; Iazigi, N.; Santoro, J. R. (Hospital das Clinicas-Setor de Pediatrica, Rua Bernardino de Campos, 1000, 14100-Ribeirao Preto, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(1):37-40; 1977.

4513 EFFECT OF SODIUM ON THE ACTIVE TRANSPORT OF SUGAR IN THE RAT SMALL INTESTINE [Abstract]. (Ger.) Forster, H.; Beyer, R. (Zentrum der Biologischen Chemie, Theodor-Stern-Kai 7, D-6000 Frankfurt, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(3):233; 1977.

See also, 4491, 4542, 4544, 4562, 4570, 4574, 4575, 4612, 4695, 4865, 4913, 4915, 5184, 5192, 5219.

4514 PRESSURE PROFILE OF ESOPHAGEAL PERISTALSIS IN NORMAL HUMANS AS MEASURED BY DIRECT INTRAESOPHAGEAL TRANSDUCERS.

(Eng.) Humphries, T. J.; Castell, D. O. (Naval Regional Medical Center, Philadelphia, PA 19145). *Am. J. Dig. Dis.* 22(7): 641-645; 1977.

The pressure profile of esophageal peristalsis was studied in healthy young men using an intraesophageal transducer assembly. The amplitude of peristaltic contractions following wet swallows was determined at intervals along the esophagus from the lower esophageal sphincter (LES) to the upper esophageal sphincter (UES). The amplitude profile revealed a trough of significantly decreased ($p<0.05$) amplitude at 17.5-20.0 cm above the LES. The change in pressure per unit time (dp/dt) also produced a profile with a significant decrease ($p<0.01$) in the upper esophagus; it correlated ($r=0.91$, $p<0.001$) with the amplitude profile. The mean velocity of the peristaltic wave in the upper esophagus varied from 2.92 ± 0.19 to 3.29 ± 0.36 cm/sec. In the distal esophagus, the mean velocity increased significantly ($p<0.01$) to 4.98 ± 0.38 cm/sec at 7.5 cm above the LES and then fell significantly ($p<0.05$) to 2.15 ± 0.27 cm/sec at 2.5 cm above the LES. The dp/dt could possibly be used in the early detection of esophageal diseases.

4515 TEMPERATURE DEPENDENCE OF RESPONSES OF ESOPHAGEAL SMOOTH MUSCLE TO ELECTRICAL FIELD STIMULATION.

(Eng.) de Carle, D. J.; Szabo, A. C.; Christensen, J. (Dept. Internal Medicine, Univ. Iowa, Iowa City, IA 52242). *Am. J. Physiol.* 232(4):E432-E436; 1977.

The effect of temperature on swallowing-induced peristalsis was investigated in the esophagus of the opossum. Strips of smooth muscle, cut transversely from the smooth muscle segment of the esophagus, were superfused with oxygenated Krebs-Ringer solution at 37 C in a system that allowed electrical field stimulation of the intrinsic nerves. Trains (3- to 5-sec) of rectangular pulses (0.5-msec long at 10 Hz) were delivered at 30-sec intervals at supramaximal maximal current strength. In strips from the esophageal body, a twitch occurred at the end of each train with a particular latency, the off response. Strips from the esophagogastric sphincter relaxed during the train. Temperature varied above and below 37 C (18-40 C) to observe the temperature dependence of the responses. Latency of the off-response varied exponentially with temperature. Amplitude of the off response showed a linear decline with changes in temperature, both above and below 35 C, the zero intercepts being 19.6 and 42.3 C, resp. Amplitude of relaxation of strips from the junction varied little between 20 and 37 C but declined sharply beyond those limits, the zero intercepts being 14.2 and 42 C, resp. These studies show that the operation of the circular layer of smooth muscle in the esophageal body is sensitive to changes in temperature.

4516 INFLUENCE OF VAGAL COOLING ON ESOPHAGEAL FUNCTION.

(Eng.) Ryan, J.; Snape, W. J., Jr.; Cohen, S. (Temple Univ. Sch. Medicine and Univ Pennsylvania Hosp., Philadelphia, PA). *Am. J. Physiol.* 232(2):E159-E-164; 1977.

The effect of decreased vagal activity on the esophageal peristalsis and lower esophageal sphincter (LES) relaxation associated with pharyngeal stimulation (PS) and esophageal balloon distension (ED) was studied in opossums. The cervical vagi were exposed and cooled (individually and bilaterally) to 3 C using dry ice and alcohol-chilled saline Unilateral vagal cooling had no effect on the esophageal peristalsis or LES relaxation associated wit PS or ED. Similarly, bilateral vagal cooling did not alter the peristalsis and sphincter relaxation induced by ED. Bilateral vagal cooling, however, significantly decreased the incidence of peristalsi and the sphincter relaxation associated with PS (incidence of peristalsis reduced from a control level of 99.1 ± 0.4% to 78.0 ± 2.6%; LES relaxation reduced from 98.0 ± 0.7% to 37.3 ± 4.8%; $p<0.01$ and $p<0.001$, resp.). The effect of unilater and bilateral vagotomy on esophageal function was also examined. Neither right nor left cervical vagotomy affected esophageal peristalsis or LES relaxation, regardless of the model of stimulation Bilateral vagotomy, however, diminished the esophageal response to PS but was without effect on the peristalsis and LES relaxation produced in respons to ED. It is concluded that the vagus nerve is of primary importance in regulating the esophageal response to PS and that local neuromuscular factors within the esophageal wall are sufficient to initiate and maintain an esophageal response to distension.

4517 UPPER ESOPHAGEAL RESPONSES TO INTRALUMI DISTENTION IN MAN.

(Eng.) Enzmann, D. Harell, G. S.; Zboralske, F. F. (Stanford Univ. Sc Medicine, Stanford, CA 94305). *Gastroenterology* 72(6):1292-1298; 1977.

The site(s) of elicitation and origin of secondary peristalsis in the human esophagus were studied, a the upper esophageal sphincter (UES) and proximal esophageal body responses accompanying intralumina distention were characterized. In seven normal su jects, an intraluminal transducer probe manometric recorded the UES and 5- and 10-cm levels of the es ageal body. A second probe with a balloon attache 2 cm above the proximal strain gauge was located s that the balloon was 3 and 4 cm below the UES and four distentions were done. The balloon probe was moved in 2-cm increments (four distensions at each site) until lower esophageal sphincter pressures were recorded. No secondary peristalsis occurred after distention in the proximal 6 cm. The incidence of secondary peristalsis increased as the di tention site moved distally. Sixty-nine percent o secondary peristaltic waves originated in the esop ageal body proximal to the distention site. The U pressure significantly increased over resting pres sure (augmentation) during 63% of distentions. Th esophagus proximal to the balloon and below the UE usually responded to distention with augmentation. Augmentation of the UES and proximal esophageal body in response to esophageal intraluminal distention and the resultant initiation of secondary peristalsis above the distention site comprise a highly integrated pressure barrier to esophagopharyngeal reflux.

4518 THE EFFECT OF PRESSURE CHANGES INSIDE THE ANTRUM ON LOWER ESOPHAGEAL SPHINCTER (LES) PRESSURE IN MAN AND DOG. (Eng.) Jennewein, H. M.; Hummelt, H.; Siewert, R.; Weiser, F.; Waldeck, F. (Klinik und Poliklinik fur Allgemeinchirurgie, Universitat Gottingen, Gottingen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(6):449-454; 1976.

The pressure change inside the lower esophageal sphincter (LES) in response to pressure changes inside the antrum was investigated in men (6) and in dogs (16 beagle bitches) with antral pouches. A pressure of 20 cm H_2O inside the antrum produced an increase in LES pressure in the dog of 14 ± 7 mm Hg ($p<0.01$) or 43% and simultaneously produced a rise in blood gastrin concentration of 29 ± 23 fmol/ml ($p<0.01$). An antral pressure of 80 cm30 cm H_2O led to a decrease of 26 ± 12 mm Hg ($p<0.01$) or 67% in LES pressure. Truncal vagotomy in dogs with innervated antral pouches abolished the excitory and inhibitory effects on LES pressure of the 20 cm H_2O antral pressure, but gastrin concentration still increased by 19 ± 16 fmol/ml ($p<0.05$). In four dogs with denervated antral pouches, antral pressure changes did not influence LES pressure or gastrin response significantly. LES pressure in dogs responded to electrical vagal stimulation. Atropine (0.5 mg/kg, i.v.) abolished the initial contraction (at 20 pulses/sec) and the excitatory effect (at 0.5 pulses/sec) in dogs. In man, a short antral pressure increase (50 cm H_2O for 30 sec) produced a decrease of LES pressure from 14 ± 3.4 mm Hg to 5.2 ± 1.4 mm Hg ($p<0.01$) for about 1 min. This effect was not seen in patients after selective proximal vagotomy. It is concluded that a pressure increase inside the antrum effects LES pressure both in man and dogs.

4519 EFFECT OF CHOLECYSTOKININ-OCTAPEPTIDE ON LOWER ESOPHAGEAL SPHINCTER. (Eng.) Behar, J.; Biancani, P. (Rhode Island Hosp., 539 Eddy St., Providence, RI 02902). *Gastroenterology* 73(1):56-61; 1977.

The effect of cholecystokinin-octapeptide (CCK-OP) on the lower esophageal sphincter (LES) was studied in 50 cats *in vivo*. CCK-OP caused a dose-dependent fall in LES pressures in all but four animals. Maximal sphincter relaxation was obtained with 200-400 ng of CCK-OP per kg of body weight. Atropine sulfate (30 μg/kg) and/or hexamethonium (40 mg/kg), or adrenergic blocking agents phentolamine (1 mg/kg) or propranolol (1 mg/kg), in doses that completely inhibit the action of maximal doses of their respective agonists, failed to block the CCK-OP effect. Tetrodotoxin, however, in doses that denervated the LES (12-18 μg/kg) antagonized the CCK-OP-induced sphincter relaxation. In these tetrodotoxin-treated animals, CCK-OP produced LES contraction similar to that observed after pentagastrin. These results suggest that CCK-OP stimulates the postganglionic nonadrenergic, noncholinergic inhibitory neurons responsible for sphincter relaxation. CCK-OP also stimulates the circular muscle by direct action, causing LES contraction. The latter becomes apparent when the innervation of the LES is abolished by tetrodotoxin.

4520 EFFECT OF DOPAMINE ON ESOPHAGEAL MOTOR FUNCTION. (Eng.) Mukhopadhyay, A. K.; Weisbrodt, N. (Univ. Texas Medical Sch., Houston, TX 77030). *Am. J. Physiol.* 232(1):E19-E24; 1977.

The receptors involved in the dopamine response in esophageal smooth muscle were characterized. The i.v. administration of dopamine in opossums produced a dose-dependent decrease in lower esophageal sphincter pressure and a dose-dependent increase in contractile activity of the body of the esophagus. The threshold dose of dopamine was 0.25 μg/kg, and the effect reached a plateau at about 6 μg/kg, A dose of 6 μg/kg of dopamine produced an 83% ± 3% reduction in the lower esophageal sphincter pressure and 12 ± 1 contractions in the body of the esophagus within 5 min. Atropine (30 μg/kg), phentolamine (4 mg/kg), propranolol (2 mg/kg), and bilateral cervical vagotomy did not modify the effect of dopamine. Both haloperidol (5 mg/kg) and bulbocapnine (5 mg/kg) potently antagonized the effect of dopamine ($p<0.001$ in both cases). The amplitude of esophageal contraction in the lower esophagus in response to pharyngeal stimulation and esophageal distention was significantly increased after the administration of haloperidol. It is concluded that the i.v. administration of dopamine has potent effects on the motor function of the lower esophageal sphincter and the body of the esophagus. The effect of dopamine is not mediated via the vagal centers in the brain or cholinergic muscarinic and adrenergic receptors. The response of the smooth muscle segment of opossum esophagus to i.v. dopamine is mediated via specific dopamine receptors. The inhibitory dopamine receptors may play a physiological role in controlling the amplitude of esophageal contractions.

4521 LOWER ESOPHAGEAL SPHINCTER AND GASTRIC ACID RESPONSES TO INTRAVENOUS INFUSIONS OF SYNTHETIC HUMAN GASTRIN I HEPTADECAPEPTIDE. (Eng.) Freeland, G. R.; Higgs, R. H.; Castell, D. O.; McGuigan, J. E. (Naval Regional Medical Center, Philadelphia, PA 19145). *Gastroenterology* 71(4):570-574; 1976.

To determine whether the increased serum gastrin levels observed after feeding are involved in the control of lower esophageal sphincter (LES) pressure, human gastrin I heptadecapeptide (HGH) was administered to seven volunteers, and serum gastrin concentrations and LES pressure responses and gastric acid output were measured. HGH infusion (0.06 μg/kg hr, i.v.) increased LES pressure significantly, from a basal value of 16.4 ± 0.3 mm Hg to 22.4 ± 3.3 mm Hg at 90 min ($p<0.05$); LES pressure decreased to 17.5 ± 2.9 mm Hg 15 min after the infusion was stopped. Concurrently, gastric acid output increased insignificantly from a mean basal value of 2.28 ± 0.58 mEq/15 min to 5.15 ± 2.11 at 90 min. Serum gastrin levels increased significantly from a mean basal value of 86 ± 3 pg/ml to 116 ± 17 pg/ml at 75 min ($p<0.05$) and 110 ± 12 pg/ml at 90 min. The infusion of a higher level of HGH (0.12 µg/kg hr) also produced significant increases in LES pressure ($p<0.01$) and serum gastrin output ($p<0.01$); the gastric acid output increased significantly from a basal level of 1.99 ± 0.75 mEq/15 min to 5.08 ± 2.37 and 5.06 ± 0.87 mEq/15 min ($p<0.02$) at 75 and 90 min, resp. The infusion of 0.25 µg/kg/hr HGH produced progressively greater increases in LES pressure ($p<0.05$), gastric acid output ($p<0.01$), and serum gastrin concentrations ($p<0.01$). The peak serum gastrin level occurred 30 min after ingestion of a protein meal, increasing to 108 ± 14 pg/ml from a basal level of 62 ± 4 pg/ml ($p<0.05$). LES pressure increased concurrently and reached a peak 35 min after ingestion of the meal to 27.1 ± 4.0 mm Hg from a basal level of 17.0 ± 0.3 mm Hg ($p<0.05$). The results suggest that although increases in serum gastrin concentration may contribute to increases in LES pressure seen after feeding, the increase in LES pressure produced by feeding cannot be explained exclusively on the basis of endogenous gastrin release.

4522 EFFECT OF MOTILIN ON THE LOWER ESOPHAGEAL SPHINCTER OF THE OPOSSUM.

(Eng.) Gutierrez, J. G.; Thanik, K. D.; Chey, W. Y.; Yajima, H. (Genesee Hosp., 224 Alexander St., Rochester, NY 14607). *Am. J. Dig. Dis.* 22(5):402-405; 1977.

The effect of Yajima's synthetic motilin on the lower esophageal sphincter (LES) of the opossum was studied, and its potency was compared to that of gastrin and its interaction with secretin examined. Dose-response curves for the LES were constructed from the i.v. bolus injection of graded doses of motilin and gastrin alone and motilin given against a background infusion of secretin. The smallest dose of motilin that elicited a significant response was 0.05 µg/kg, and the highest response was observed with the highest dose used (1.0 µg/kg). Over a wide dose range, both motilin and gastrin were equally potent in stimulating the LES, and secretin caused inhibition of the LES pressure response to motilin. It is concluded that (1) motilin is a potent stimulant of the LES, (2) this response is dose dependent, (3) the potency of motilin is similar to that of gastrin, and (4) secretin counteracts the effect of motilin on the LES.

4523 EFFECT OF PENTAGASTRIN INFUSION ON GASTROESOPHAGEAL MANOMETRY AND REFLUX STATUS BEFORE AND AFTER ESOPHAGOGASTRECTOMY.

(Eng.) Moossa, A. R.; Hall, W.; Wood, R. A. B.; Cooley, G. R.; Skinner, D. B. (Dept. Surgery, Univ. Chicago, Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Am. J. Surg.* 133(1):23-28; 1977.

To elucidate the nature of the lower esophageal sphincter, the pressure profile, functional integrity, and response to pentagastrin of the lower esophagus were studied in Rhesus monkeys. The effect of replacement of the distal esophageal segment by a sleeve of stomach was also assessed. Five of eight animals were determined to be nonrefluxers, and these animals had a mean manometrically determined, preoperative high-pressure-zone (HPZ) pressure of 8.9 ± 0.85 mm Hg; three monkeys with reflux had a mean HPZ pressure of 6.6 ± 0.59 mm Hg. During a continuous pentagastrin (0.25 µg/kg/hr or 0.75 µg/kg/hr) infusion, the lower esophageal pressure increased rapidly at the start of infusion and reached a peak between 3 and 15 min; lower esophageal pressure increased from a baseline of 8.3 ± 0.75 mm Hg to a peak of 12.0 ± 0.86 mm Hg with the lower rate of infusion. Postoperatively, the response of all animals to pentagastr was similar to that noted preoperatively. Neither operation nor pentagastrin infusion altered the reflux status of any animal, all being nonrefluxer on every postoperative test. It is concluded that the ability to respond to pentagastrin infusion as a physiologic sphincter is a property of all of the upper gastrointestinal tract.

4524 EFFECT OF VASOACTIVE INTESTINAL POLYPEPT (VIP) ON THE LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP).

(Eng.) Rattan, S.; Said, S. I.; Goyal, R. K. (Univ. Texas Health Science Center, 5323 Harry Hines Blvd., Dallas, TX 75235). *Proc. Soc. Exp. Biol. Med.* 155(1):40-43; 1977.

The effect of vasoactive intestinal polypeptide (V on the lower esophageal sphincter (LES) was studie in anesthetized opposums. The i.v. administration of VIP at doses $\geq$0.25 µg/kg caused a dose-related fall in LES pressure. A dose of 8 µg/kg produced "maximal" fall of 36.8 ± 2.9 mm Hg (80.5 ± 4.5%) i sphincter pressure. The effect of VIP (8 µg/kg) was not antagonized by tetrodotoxin in doses that antagonized neural activity in the LES (10-40 µg/k Propranolol (1 mg/kg, i.v.) also failed to antagonize this inhibitory effect of VIP. These studies show that VIP exerts an inhibitory effect on the LES that may be due to a direct action on the sphin ter muscle.

4525 EXCITATION CONDUCTION IN AUERBACH'S PLEX OF RABBIT SMALL INTESTINE.

(Eng.) Yokoyama, S.; Ozaki, T.; Kajitsuka, T. (Fukushima Medical Coll., Fukushima, Japan). *Am. J. Physiol.* 232 (2):E100-E108; 1977.

Excitation conduction in Auerbach's plexus was investigated in the rabbit small intestine by analyzing its evoked potentials as the response to a single electrical stimulus given to this plexus. When the conduction distance was 1 mm, two spike waves were recorded. Conduction velocities of ner impulses were 0.3-0.5 msec, and chronaxie was 0.06-0.11 msec. When the distance between stimulating and recording electrodes was further increased, evoked potential waves became multiple and small, until beyond 15 mm in the longitudinal direction and beyond 3 mm in the circular direction they could no longer be recorded. Evoked potentials recorded at a distance >2 mm were reduced in their amplitude, and some potential waves were abolished after repeated stimulation with high frequencies (>50/sec), hexamethonium (10^{-4} g/ml) application, and a lack of oxygen. It is concluded that in Auerbach's plexus, nerve impulses spread through multiple pathways, conducting mainly on the longitudinal axis of the small intestine, and that some impulses make synaptic transmission at ganglia.

4526 EXCITATION CONDUCTION IN MEISSNER'S PLEXUS OF RABBIT SMALL INTESTINE. (Eng.) Yokoyama, S.; Ozaki, T.; Kajitsuka, T. (Fukushima Medical Coll., Fukushima, Japan). *Am. J. Physiol.* 232 (2):E109-E113; 1977.

Excitation conduction in Meissner's plexus was investigated in the rabbit small intestine by analyzing the records of potentials evoked by a single electrical stimulus applied to this plexus. Experiments were performed on the Meissner's plexus that remained attached to the circular muscle after the longitudinal muscle and mucous membrane were removed from intestinal segment. Conduction velocities of nerve impulses were 0.3-0.7 msec, chronaxie of the nerve bundle was 0.06-0.12 msec, while the distance between the stimulating and recording electrodes was increased, the latency of the evoked potentials was prolonged, the number increased, and the amplitude decreased; no potentials could be recorded when the distance was 4 mm. Evoked potentials recorded at relatively long conduction distance were reduced in amplitude or abolished after a repeated stimulation with high frequencies (>50/sec) after hexamethonium application (10^{-4} g/ml), and in a state of lack of oxygen. Nerve impulses appear to spread through multiple pathways and make synaptic transmission at a relatively short conduction distance in Meissner's plexus.

4527 CHARACTERISTICS OF THE RELAXANT RESPONSE OF ADENOSINE AND ITS ANALOGS IN INTESTINAL SMOOTH MUSCLE. (Eng.) McKenzie, S. G.; Frew, R.; Bar, H. P. (Dept. Pharmacology, Univ. Alberta, Edmonton, Alberta T6G 2H7, Canada). *Eur. J. Pharmacol.* 41(2):183-192; 1977.

Basic pharmacological data on time and dose dependence, site of action, and structure-activity requirements of adenosine were studied to investigate the possible relationship between adenosine-induced relaxation and smooth muscle cyclic AMP levels. Responses to adenosine or to ATP in longitudinal muscle strips of the small intestine of the rabbit were reported to be biphasic, i.e., an initial suppression of contractile activity was followed by a sustained phase of inhibition. Cumulative application of relaxant doses of adenosine or ATP caused less total response than one single application of the cumulative dose. Neither procaine (1 mM), lidocaine (0.17 mM), or guanethidine (10 μM) antagonized the responses to adenosine or to ATP, and the responsiveness of muscles obtained from reserpinized animals appeared unchanged. Histamine, serotonin, and prostaglandin E_1 caused contractile responses. Adenosine derivatives and analogs containing a primary or secondary 6-amino group and unsubstituted 2',3'-hydroxy groups acted as agonists. Those nucleosides (100 μM) found to be inactive plus papaverine (0.1-5 μM), imidazole (10-20 μM), dipyridamole (1 μM), 6-(*p*-nitrobenzyl) thioguanosine, and propranolol (10 μM) did not modify appreciably the responsiveness of the muscle to adenosine or to ATP. Phentolamine (10 μM) and theophylline (10 μM) antagonized adenosine responses. Theophylline (100 μM) produced antagonism (68 ± 5%, N=5) to adenosine at 10 μM concentration; but this inhibitory effect was surmounted at adenosine doses of more than 100 μM. A number of 1,3-alkyl-6-thioxanthines (1-10 μM) caused a slow and small depression of muscle contraction. The results suggest an extracellular receptor site for adenosine and its analogs and the absence of an indirect mechanism of action via nerve stimulation.

4528 EFFECT OF CHOLECYSTOKININ ON MYOELECTRIC ACTIVITY OF SMALL BOWEL OF THE DOG. (Eng.) Mukhopadhyay, A. K.; Thor, P. J.; Copeland, E. M.; Johnson, L. R.; Weisbrodt, N. W. (Univ. Texas Medical Sch., Houston, TX 77030). *Am. J. Physiol.* 232 (1):E44-E47; 1977.

The effect of cholecystokinin on myoelectric activity was determined in the small intestine of conscious dogs. Six animals were implanted with electrodes along the small intestine, and a cannula was placed in the stomach. A second cannula was inserted into the duodenum in three animals, and a pancreatic fistula was prepared in three others. Recordings were made in the fasted state, during the i.v. infusion of either saline or cholecystokinin-octapeptide (CCK-OP, 125 ng/kg/kr), during the intraduodenal infusion of either saline or L-tryptophan (2 or 4 mmol/hr), and during the fed state. CCK-OP disrupted the fasted pattern of myoelectric activity and caused dose-dependent increases in spike potentials and in pancreatic protein secretion. Stimulation of myoelectric activity occurred at doses that produced submaximal protein secretion; however, the stimulation was not identical to that seen with feeding. Intraduodenal infusion of L-tryptophan increased pancreatic protein secretion, interrupted the fasted pattern of motility, and induced a pattern similar to that seen with feeding. It is concluded that CCK alters small intestinal motility and may play a role in the changes in small bowel motility caused by the ingestion of food.

4529 INHIBITORY EFFECT OF METHIONINE- AND LEUCINE-ENKEPHALIN ON CONTRACTIONS OF THE GUINEA-PIG ILEUM ELICITED BY PGE_1. (Eng.) Jaques, R. (Pharmaceuticals Div., CIBA-GIGY Ltd., CH-4002 Basel, Switzerland). *Experientia* 33(3): 374-375; 1977.

The hypothesis that enkephalins antagonize intestinal contractions elicited by prostaglandin E_1 (PGE_1) and that this effect is reversible through the interaction of an opiate antagonist (naloxone) was tested. Low concentrations of methionine-enkephalin (3-30 nM) and leucine-enkephalin (50-100 nM) produced a dose-dependent inhibition of contractions elicited by PGE_1 (0.1 μg/ml) in the isolated guinea pig ileum. Naloxone reversed the inhibitory effects of the enkephalins at concentrations of 650-1,000 mM. These studies show that, like morphine and other narcotic analgesics, enkephalins inhibit the effect of PGE_1 on smooth muscle. This result may implicate prostaglandins in the pathogenesis of pain. The authors suggest that enkephalins or enkephalin-like peptides could occur in the intestine and play a role in regulating gastrointestinal motility.

4530 ACTION OF METHYLXANTHINES AND IMIDAZOLE ON THE CONTRACTILITY OF THE TERMINAL ILEUM OF THE GUINEA PIG. (Eng.) Kazic, T. (Faculty Medicine, Beograd, Yugoslavia). *Eur. J. Pharmacol.* 41(2):103-111; 1977.

The actions of methylxanthines (aminophylline and caffeine) and imidazole on the contractile responses of the terminal ileum were studied to elucidate whether the effects of these substances were attributable to their opposite influences on cyclic nucleotide phosphodiesterase. Aminophylline and caffeine (0.02-24 mM) produced dose-related contractions (5-100% of the maximal contraction) of the terminal ileum that were reduced 79 ± 3% by atropine (1 μg/ml). Physostigmine (0.12 μM) produced two- to threefold potentiation of the contractions produced by aminophylline and caffeine. Hemicholinium (1.75 mM) selectively inhibited (50-70%) the responses to aminophylline and caffeine. The responses to imidazole and noradrenalin were relatively unaffected by atropine, physostigmine, and hemicholinium. Aminophylline (2.2-11 μM) and caffeine (225 μM) were much more efficient in potentiating the responses to electrical stimulation at 30 Hz frequency (train duration 1 sec) than those to electrical stimulation at 3 Hz frequency (train duration 2 sec). Imidazole did not show this type of selectivity and potentiated both types of responses. The potentiation of the nerve-mediated responses by methylxanthines to electrical stimulation was dependent on the external concentration of calcium. Higher concentrations of aminophylline (>0.1 mM) were reported to inhibit histamine- and noradrenalin-induced contractions, presumably due to inhibition of phosphodiesterase in the smooth muscle and subsequent elevation of cyclic AMP levels. It is suggested that the action of imidazole is related to its activating influence on phosphodiesterase in the smooth muscle and that the action of methylxanthines may involve some mechanism other than inhibition of phosphodiesterase.

4531 MODELS OF GASTRIC EMPTYING. (Eng.) Stubbs, D. F. (Anti-Inflammatory Disease Products, Upjohn Co., Kalamazoo, MI 49001). *Gut* 18(3):202-207; 1977.

Some empirical and theoretical models of the emptying behavior of the stomach are presented, and a new model of gastric emptying is derived. Published data on humans were used to test the model and eva uate empirical constants. For meals with an initi volume of ≥300 ml, the reciprocal of the cube root of the volume of meal remaining is proportional to the time the meal is in the stomach. For meals of initial volume of <300 ml, the equation has to be corrected for the fact that the resting volume of gastric contents is about 28 ml. As this model in no neural or hormonal factors, it is suggested tha the gastric emptying response to the volume of a meal does not depend on these factors. The gastri emptying response to the composition of the meal does depend on such factors, and a recent model of this process is used to evaluate an empirical constant.

4532 REEVALUATION OF TRIETHERS AS MARKERS FOR TRIGLYCERIDES DURING GASTRIC EMPTYING. (Eng.) Hoving, J.; Wilson, J. H. P.; Pratt, J. J. Woldring, M. G. (Univ. Hosp., Groningen, Netherlands). *Am. J. Dig. Dis.* 22(5):449-453; 1977.

The validity of using triethers as markers for tri glycerides during gastric emptying was investigate in male Wistar rats and in two humans. The rats received by gastric tube 0.3 ml olive oil containi either 5 μCi ^{131}I-triolein plus 0.5 μCi ^{75}Se-triet or 1.5 μCi ^{14}C-triolein plus 12 μCi ^{3}H-triether. Two duodenal ulcer patients received 18.5 g corn oil, 34.5 g glucose, 31.5 g skimmed milk powder/30 ml water, and 2.1 μCi ^{75}Se-triether dissolved in a mixture of saturated medium-chain triglycerides. The analysis of gastric contents at 0, 15, 60, and 120 min after administration in the rats and at 15 30, and 45 min in the humans showed no evidence of separation of triglyceride and triether in the sto ach. The disappointing results of other workers using ^{3}H-triether may be due to an artifact associated with instability of the tritium-to-triether bond in the preparation used.

4533 GASTRO-DUODENAL MOTILITY IN HEALTH AND DISEASE [Abstract]. (Eng.) Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Rend. Gastroenterol.* 9(1):67; 1977.

4534 EFFECT OF SUBSTANCE P AND SOME RELATED PEPTIDES ON GASTROINTESTINAL MOTILITY [Abstract]. (Eng.) Bertaccini, G.; Impicciatore, M. (Istituto de Farmacologia dell'Universita, Parm Italy). *Rend. Gastroenterol.* 9(1):65-66; 1977.

4535 DOSE RESPONSE TO INTRAVENOUS GLUCAGON AS MEASURED BY ROENTGENOGRAPHY [Abstract]. (Eng.) Chernish, S. M.; Miller, R. E.; Brunelle, R. L.; Rosenak, B. D. (Lilly Lab. Clinical Res., Indianapolis, IN 46202). *Fed. Proc.* 36(3):1019; 1977.

4536 EFFECT OF GLUCAGON ON GASTRIC MUCOSAL POTENTIAL DIFFERENCE AND ULTRASTRUCTURE IN MAN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K J.; Krause, W. J.; Burks, M.; Jeffrey, G. E.

(Veterans Admin. Hosp., Univ. Missouri, Columbia, MO 65201). *Fed. Proc.* 36(3):1019; 1977.

4537 ASSESSMENT OF LOWER OESOPHAGEAL SPHINCTER PRESSURES MEASURED BY THE RAPID PULL-THROUGH METHOD [Abstract]. (Eng.) Greaney, M. G.; Chattopadhyay, D. K.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gut* 18(5):A404; 1977.

4538 EFFECTS OF BETHANECHOL CHLORIDE AND CIGARETTE SMOKING ON LOWER OESOPHAGEAL SPHINCTER PRESSURE IN NORMAL SUBJECTS [Abstract]. (Eng.) Chattopadhyay, D. K.; Greaney, M. G.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gut* 18(5):A403-A404; 1977.

4539 EFFECT OF PENTAGASTRIN ON LESP IN BILLROTH II GASTRECTOMIZED PATIENTS AND SUBJECTS WITH CONTINUOUS ANTRAL ACIDIFICATION [Abstract]. (Eng.) Corazziari, E.; Pozzessere, C.; Dani, S.; Delle Fave, G. F.; De Magistris, K.; Anzini, F.; *et al.* (Cattedra di Gastroenterologia dell'Universita, Roma, Italy). *Rend. Gastroenterol.* 9(1):68; 1977.

4540 FAILURE OF ATROPINE TO INHIBIT GASTRIN 17 STIMULATION OF THE LOWER ESOPHAGEAL SPHINCTER (LES) IN MAN [Abstract]. (Eng.) McCallum, R. W.; Jensen, D. M.; Walsh, J. H. (Yale Univ. Sch. Medicine, New Haven, CT). *Clin. Res.* 24(5):628A; 1976.

4541 ELECTRIC AND MECHANICAL COORDINATION OF THE GASTRODUODENAL JUNCTION IN DOGS: A COMPUTER ANALYSIS [Abstract]. (Eng.) Marzio, L.; Sarna, S. K.; Daniel, E. E.; Waterfall, W. E.; Munjiappan, M.; Lanfranchi, G. A. (Istituto di Clinica Medica e Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):71; 1977.

4542 INTERRELATIONSHIPS BETWEEN MOTOR ACTIVITY AND TRANSMUCOSAL TRANSPORT IN THE HUMAN SMALL INTESTINE IN VIVO [Abstract]. (Eng.) Morris, A. I.; Pimblett, K. A.; Hall, L.; Turnberg, L. A. (Hope Hosp., Salford, England). *Gut* 18(5):A426; 1977.

4543 COLONIC COMPLIANCE--AN IMPROVED INDEX OF COLONIC MUSCULAR ACTIVITY [Abstract]? (Eng.) Hay, A. M.; Vickery, C. J.; Welbourn, R. B. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5):A411; 1977.

See also, 4486, 4550, 4569, 4687, 4693, 4707, 4727 4743, 4790, 4794, 4825, 4881, 4927, 4950 5189, 5190, 5215, 5251.

SECRETION AND METABOLISM

4544 A PHYSICAL MODEL FOR THE SIMULTANEOUS MEMBRANE TRANSPORT AND METABOLISM OF DRUGS. (Eng.) Ho, N. F. H.; Park, J.; Morozowich, W.; Higuchi, W. I. (Coll. Pharmacy, Univ. Michigan, Ann Arbor, MI). *J. Theor. Biol.* 61(1):185-193; 1976.

A physical model for the intestinal transport of solutes is mathematically described. An aqueous diffusion layer barrier is employed in series with a membrane barrier (a passive diffusional-bioconversion pathway) with an operational aqueous pore pathway in parallel. The model provides the basis for the experimental design of *in situ* studies and for the quantification of physically meaningful and experimentally accessible transport and overall bioconversion kinetic parameters. The interaction and factorization of the following are mathematically explicit: the permeability coefficients of the aqueous diffusion layer, the aqueous pores of the membrane, and the principal membrane transport-bioconversion pathway; the pH and negative logarithm of the equilibrium constant (pKa); and the lipophilicity of the solute. The model is applied to the simultaneous transport and metabolism of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) across the jejunal membrane of the rat using an *in situ* non-perfusion technique. The apparent first-order absorption rate constant versus pH profiles at two hydrodynamic situations show the physical interactions between the pH and permeabilities of the aqueous diffusion layer, passive transport-bioconversion pathway, and aqueous pores. Qualitative analyses by high pressure liquid chromatography and thin layer chromatography of the plasma fraction of portal vein blood indicated the presence of 15-keto-$PGF_{2\alpha}$ and 15-keto-13,14-dihydro-$PGF_{2\alpha}$ and the absence of $PGF_{2\alpha}$.

4545 IMMUNOLOGICAL ASPECTS OF SECRETIN, SUBSTANCE P, AND VIP. (Eng.) Yanaihara, N.; Sakagami, M.; Sato, H.; Yamamoto, K.; Hashimoto, T.; Yanaihara, C.; *et al.* (Shizuoka Coll. Pharmacy, 2-2-1 Oshika, Shizuoka, Japan 422). *Gastroenterology* 72(4):803-810; 1977.

Secretin, substance P, and vasoactive intestinal peptide (VIP) were studied immunologically using synthetic hormones and their related peptides. The properties of these hormones were characterized by radioimmunoassays specific to the respective hormones. Antisecretin antisera (NCC-R-1 and R-801) were generated in rabbits with synthetic porcine secretin adsorbed on polyvinylpyrrolidone. Antiserum to substance P (R-400) was produced in a rabbit with synthetic substance P-human α-globulin conjugate. Generation of anti-VIP antiserum (R-502) was carried out by immunizing rabbits with synthetic VIP adsorbed on polyvinylpyrrolidone. Synthetic polypeptides related to the three hormones that were examined included secretin(4-27), secretin-(5-27), secretin(7-27), secretin(11-27), secretin-(14-27), secretin(18-27), secretin(1-22)amide, secretin(7-22)amide, N^{α}-tyrosyl-secretin, [1-Tyr]-secretin, [4-Ala]secretin, [4-D-Ala]secretin, [4-Ala,5-val]secretin, [6-Tyr]secretin, substance P(2-11), substance P(3-11), substance P(4-11), substance P(5-11), substance P(6-11), N^{α}-tyrosyl-substance P, [1-Tyr]substance P, [8-Tyr]substance P, [11-Leu]substance P, des-11-Met-substance P, VIP(7-28), VIP(11-28), VIP(18-28), VIP(1-18)amide, and VIP(1-22)amide. The results revealed two antigenic regions at the amino- and carboxyl-terminal portions of the secretin and VIP molecules. The major antigenic region of substance P was located within the 3 to 11 sequence. The proline residue in position 4 and methionine in position 11 seemed to be of special importance. The immunoassays demonstrated the existence of immunoreactivities of these hormones in hot water extracts from various porcine tissues. In the pituitary, VIP and substance P immunoreactivities were detected, whereas secretin was not. Secretin, VIP, and substance P were found in the pancreas, but at low concentrations. Distributions of these hormones in various sites of the gastrointestinal tract were also demonstrated.

4546 CARBOHYDRATE METABOLISM IN LUNG TISSUE OF ALCOHOLIC RATS [Abstract]. (Eng.) Rinaudo, M. T.; Ponzetto, C.; Curto, M.; Bruno, R.; Tavormina, V.; Gaggiotti, G. (Istituto de Chimica biologica, Universita di Torino, Turin, Italy). *Ital. J. Bio- chem.* 26(1):79; 1977.

4547 ROLE OF CALCIUM IN ISOPROTERENOL-MEDIATE EXOCYTOSIS IN THE RAT PAROTID GLAND [Abstract]. (Eng.) Weiss, S. J.; Leslie, B. A.; Marier, S. H.; Putney, J. W., Jr. (Wayne State Univ., Detroit, MI 48201). *Fed. Proc.* 36(3): 457; 1977.

4548 MEASUREMENT OF IMMUNOREACTIVE CCK-PZ IN THE GI TRACT AND IN THE CENTRAL NERVOUS SYSTEM OF SEVERAL ANIMAL SPECIES [Abstract]. (Eng Del Mazo, J. (Veterans Admin. Hosp. and Emory Univ Sch. Medicine, Atlanta, GA). *Gastroenterology* 72(5, Part 2):1047; 1977.

4549 CLINICAL AND EXPERIMENTAL OBSERVATIONS ON THE ACTIONS OF UROGASTRONE [Abstract] (Eng.) Gillespie, I. E.; Elder, J. B.; Koffman, C. G.; Gregory, H. (Manchester Royal Infirmary, Manchester, England). *Rend. Gastroenterol.* 9(1): 62; 1977.

See also, 4700, 4858, 5184.

SECRETION AND METABOLISM

Stomach

550 EFFECT OF CHANGES IN THE INTRAGASTRIC MILIEU ON COMPETENCE OF THE GASTRO-OESOPHAGAL REGION. A STUDY IN NORMAL SUBJECTS. (Eng.) Besby, S. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12(2):215-220; 1977.

Gastroesophageal competence was assessed in 10 healthy subjects during pentagastrin-stimulated acid secretion, during insulin-induced hypoglycemia, and after the intragastric instillation of HCl. The manometrically determined mean basal sphincter pressure was 14 ± 3 mm Hg. No reflux occurred in the basal state; in the basal state when the legs were raised, there was one reflux episode. During pent gastrin infusion (0.015 g/kg, i.v., 15 min), there were eight episodes of reflux in six subjects, but this was not statistically significant. There wer no significant differences in intragastric pressur during leg raising before or after pentagastrin infusion. Although 60 min following the i.v. inje tion of insulin (0.2 IU/kg) the intragastric pH wa reduced from a mean 1.6 to a mean 1.1 ($p<0.01$), hypoglycemia and increased intragastric acidity ha no significant effect on gastroesophageal competen or sphincter pressure, either while the subject wa at rest or during leg raising. The intragastric instillation of 0.1 N HCl (200 ml) reduced the int gastric pH from 1.6 to 1.1 and resulted in 26 episodes of reflux in seven subjects ($p<0.02$). There was no significant change in intragastric pressure on leg raising during the instillation of HCl. The results demonstrate that in normal subjects only the increased gastric acidity resulting from HCl instillation causes a weakening of the gastroesophageal region.

4551 EFFECT OF LONG-TERM PARENTERAL FEEDING ON GASTRIC SECRETION IN DOGS. (Eng.) Thor, P. J.; Copeland, E. M.; Dudrick, S. J.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77030). *Am. J. Physiol.* 232(1):E39-E43; 1977.

Total parenteral nutrition was used to study the effects of food on gastric secretion and serum gastrin levels. Three dogs were surgically prepared with gastric fistulas and Heidenhain (vagally denervated) pouches. Acid and pepsin responses to pentagastrin and food were determined before and at the end of a 1-month period of total parenteral feeding, and 1 month after resumption of a normal p.o. diet. Acid and pepsin output from the denervated pouch in response to pentagastrin and food decreased significantly ($p<0.001$) after parenteral feeding and returned to control levels after the dogs resumed a normal diet. Secretory outputs from the gastric fistula in response to pentagastrin remained unchanged. Basal serum gastrin levels decreased 50% during the period of i.v. feeding and returned to levels approximately twice control levels following resumption of normal food intake. Serum gastrin responses to a meal also decreased during parenteral nutrition and returned to higher than normal levels following a 1-month period of p.o. intake. These studies indicate that the absence of p.o. food intake in the dog does not result in decreased acid secretion from the innervated stomach. Vagal innervation in some way is responsible for the preservation of normal secretion during the absence of food from the gastrointestinal tract.

4552 STEREOLOGICAL ANALYSIS OF THE PARIETAL CELL DURING ACID SECRETION AND INHIBITION. (Eng.) Zalewsky, C. A.; Moody, F. G. (Univ. Utah Medical Center, 50 North Medical Drive, Salt Lake City, UT 84132). *Gastroenterology* 73(1):66-74; 1977.

A stereological membrane analysis was carried out to quantitate the ultrastructural changes of canine parietal cells of the fundic gastric mucosa during inhibition of histamine-activated acid secretion by cimetidine (3 mg/kg/hr), isoproterenol (1 μg/kg/min), and thiocyanate (0.2 mEq/min). Surface density (S_V) of secretory, tubulovesicular, and nutrient membranes was quantitated by stereological methods. Of 118 parietal cells taken from resting mucosa, 5.7% appeared secreting and 13.6% of 165 histamine-stimulated cells retained their resting configuration. With histamine (1 μg/kg/min), secretory membrane increased and tubulovesicular membrane was reduced. Except for thiocyanate-inhibited cells, a linear relationship existed between secretory membrane S_V and acid output. Complete-inhibition of histamine-stimulated acid secretion was produced by cimetidine in 30-45 min, isoproterenol in 1.5-4 hr, and thiocyanate in 1.25 hr. Based on their ultrastructural response, a total of 88.6% of cimetidine-inhibited cells returned to resting in comparison to 51.1% of isoproterenol-inhibited cells and 26.4% of thiocyanate-inhibited cells. Thus, after treatment by cimetidine, secreting cells returned most quickly and completely to their resting ultrastructural state. Isoproterenol was a slower-acting inhibitor with an ultrastructural effect intermediate between those of cimetidine and thiocyanate. Both cimetidine and isoproterenol decreased secretory membrane S_V during acid inhibition. In contrast, thiocyanate-inhibited parietal cells showed no statistical decrease in S_V, although lumenal acid secretion ceased.

4553 INCREASED SERUM GASTRIN CONCENTRATIONS AND GASTRIC ACID HYPOSECRETION IN THE IMMEDIATE NEWBORN PERIOD. (Eng.) Euler, A. R.; Byrne, W. J.; Cousins, L. M.; Ament, M. E.; Leake, R. D.; Walsh, J. H. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Gastroenterology* 72(6):1271-1273; 1977.

Thirty-two infants and their mothers were studied to determine the source of elevated serum gastrin concentrations in umbilical blood and to learn whether neonates hypersecrete acid in response to hypergastrinemia. The mean maternal gastrin level at delivery was significantly higher (mean, 67 pg/ml) than in 809 normal adults (mean, 49 pg/ml, $p<0.001$) and in levels postpartum (mean, 50 pg/ml, $p<0.001$). The serum gastrin levels in the umbilical artery (mean, 105 pg/ml) and vein (mean, 107 pg/ml) were similar ($p>0.5$), but were significantly higher than maternal delivery samples ($p<0.001$). The umbilical artery and vein values were significantly higher than infant values at 4 hr (mean, 76 pg/ml; $p<0.001$, $p<0.005$) and 8 hr (mean, 74 pg/ml; $p<0.025$, $p<0.05$). No significant amount of gastrin was measured in placental extracts. These results suggest that the increased neonatal gastrin concentrations were fetal in origin. Continuous basal acid secretory studies done for 4 hr in 32 infants and for 8 hr in 9 infants demonstrated gastric acid hyposecretion for the first 5 hr of life ($p<0.001$). Acid secretion during hours 6-8 was similar to that in 14 older children ($p>0.5$). Increased gastrin levels were still present at hour 8 and were associated with normal gastric acid secretion.

4554 STIMULATION OF GASTRIN SECRETION AND SYNTHESIS IN ANTRAL ORGAN CULTURE. (Eng.) Harty, R. F.; van der Vijver, J. C.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *J. Clin. Invest.* 60(1):51-60; 1977.

Stimulation of gastrin release and the synthesis of gastrin were examined directly by measuring the incorporation of ^{3}H-tryptophan into gastrin in rat antral mucosal explants maintained in organ culture. Gastrin synthesis and secretion were assessed simultaneously at intervals during explant culture. Antral mucosal explants from fed female Wistar rats were cultured at 37 C (95% O_2/5% CO_2) in medium containing 70% Trowell-T8 and 10% NCTC-135 without tryptophan, 10% dialyzed fetal calf serum, and ^3H-tryptophan (100 μCi/ml). Incorporation of ^3H-tryptophan into immunoreactive gastrin was determined by double-antibody immunoprecipitation. Antral tissue protein synthesis was assessed by ^3H-tryptophan incorporation into tissue protein of the cultured explants. In paired experiments, gastrin synthesis and secretion in the presence of dibutyryl cyclic AMP (DBCAMP) were compared to those in control conditions. Gastrin and protein specific activity increased progressively with time. Gastrin specific activity at 30 min increased from 3.3 ± 0.5 to 55.2 ± 10.6 fmol ^3H-tryptophan/pmol gastrin at 24 hr; specific activity of antral tissue protein at 30 min increased from 33.6 ± 8.4 to 1,660 ± 236 fmol ^3H-tryptophan/μg protein at 16 hr. Culturing explants for 4 hr in the presence of cycloheximide (100 μg/ml) inhibited gastrin and protein synthesis by >90% and 95%, resp. DBCAMP (10 mM) significantly increased the synthesis and secretion of antral gastrin compared with control cultured explants. The results provide a direct demonstration of gastrin synthesis by rat antral mucosal explants in organ culture, indicate that both gastrin and total antral protein synthesis are inhibited by cycloheximide, and demonstrate DBCAMP-induced stimulation of gastrin synthesis and secretion, suggesting the potentially important role of cyclic AMP in gastrin cell function.

4555 MEDIATION OF GUINEA PIG GASTRIN SECRETION IN VITRO BY CYCLIC NUCLEOTIDES. (Eng.)

Schebalin, M.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 73(1):79-83; 1977.

To determine whether cyclic nucleotides are mediators in gastrin secretion, the effect of methacholine, theophylline, and cyclic adenyl and guanyl nucleotides on gastrin secretion from antral and proximal duodenal mucosa of the guinea pig was studied. Both 2 mM dibutyryl (DB) cyclic AMP and 5 mM theophylline produced significant increases in gastrin secretion, 4.3 ± 0.7 ($p<0.001$) and 9.3 ± 2.4 pg/mg/min ($p<0.005$), resp., above basal gastrin secretion (1.5 ± 0.4 pg/mg/min). The combined effect of the two agents was additive (14.5 ± 3.6 pg/mg/min). DB cyclic GMP (2 mM) had no effect on gastrin secretion. Methacholine produced a dose-related increase in gastrin secretion that, at maximum, equaled the combined effect of theophylline and DB cyclic AMP. The results suggest that gastrin secretion is mediated in part by intracellular cyclic AMP but do not exclude a cooperative involvement of cyclic GMP.

4556 NEITHER CYCLIC AMP NOR CYCLIC GMP APPEAR TO MEDIATE ANTRAL GASTRIN RELEASE IN THE DOG. (Eng.)

Krejs, G. J.; Sauberli, H. A.; Largiader, F.; Walsh, J. H.; Blum, A. L. (Univ. Texas Health Science Center at Dallas, Southwestern Medical Sch., Dallas, TX). *Acta Hepatogastroenterol.* 24(2):106-109; 1977.

In vivo experiments were carried out in dogs to evaluate whether cyclic nucleotides act as mediato in antral gastrin release. An antral pouch was constructed, and the rest of the stomach, along with the pancreas, and small and large intestines were resected. A gastric artery supplying the pouch was cannulated and, after a basal period with saline infusion, either dibutyryl cyclic 3',5'-adenosine monophosphate (cyclic AMP, 0.2 mg/kg/min), dibutyryl cyclic 3',5'-guanosine monophosphate (cyclic GMP, 0.05 mg/kg/min), or saline were infused over a period of 60 min. To prove the viability of the pouch and to show its ability to release gastrin with proper stimulation, bethan chol chloride (urecholine) was infused into the gastric artery at the end of the experiment. Bloo samples were taken from the portal vein and assayed for gastrin. Neither cyclic AMP nor cycli GMP infusion increased portal gastrin concentration significantly. A marked increase in portal gastrin concentration, however, was observed when bethanechol chloride was infused. These studies do not support the thesis that cyclic nucleotides mediate gastrin release in the dog.

4557 INFLUENCE OF AMYTAL AND MENADIONE ON HIG ENERGY PHOSPHATES AND ACID SECRETION IN FROG GASTRIC MUCOSA. (Eng.)

Hersey, S. J. (Dept. Physiology, Emory Univ., Atlanta, GA 30322). *Biochim. Biophys. Acta* 496(2):359-366; 1977.

The influence of amytal and menadione on cellular energy levels was studied in isolated bullfrog gastric mucosa to further examine the apparently specific action of amytal on acid production. The mucosa was mounted in a double chamber to provide paired segments from the same animal, and acid secretion was measured by the pH stat method. In the first series of experiments, one member of the tissue pair was treated with 8 mM amytal, while the other member served as control. Amytal treatment resulted in a 25% decrease in ATP levels ($p<0.01$) and in a decrease in creatine phosphate from a control level of 31.9 nmol/mg to 8.3 nmol/mg ($p<0.01$). In the second series of experiments, both members of the tissue pair were treated with amytal and one member was subsequently given menadione plus ascorbate. The menadione/ascorbate was added at a time when the secretory rate had reached approximately 50% of its initial value so as to permit exposure of the tissue to menadione/ascorbate for a minimum of 30 min prior to freezin Tissues treated with menadione/ascorbate showed significantly greater ATP content (20.6 nmol/mg) and creatine phosphate levels (19.9 nmol/mg) than tissues treated with amytal alone (16.6 and 12.1 nmol/mg, resp., $p<0.01$ in both cases). Net chlori transport was measured as the difference between the short-circuit current and the rate of hydrogen ion secretion. Amytal resulted in inhibition of both short-circuit current and hydrogen ion secretion; chloride transport was thus inhibited by amytal. Chloride transport was partially restored by menadione/ascorbate to the point where inhibition of chloride transport equalled that of hydroge ion secretion. These results indicate that menadione/ascorbate can support the output of nonacidic chloride but not that of chloride associated with acid. It is concluded that an amytal-sensitive reaction, presumably at mitochondrial coupling site I, is required for acid secretion to occur and that ATP is not a sufficient source of energy for this secretory process.

4558 RAT GASTRIC MUCOSAL ADENYLYL CYCLASE. (Eng.) Thompson, W. J.; Chang, L. K.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX 77030). *Gastroenterology* 72(2):244-250; 1977.

The ability of various activators and inhibitors of gastric secretion to stimulate adenylyl cyclase activity in the *in vitro* rat stomach was studied to test the hypothesis that increased intracellular cyclic AMP is necessary for the stimulation of gastric acid secretion by secretagogues. The 600 x *g* membrane adenylyl cyclase activity was maximally stimulated by 5 mM NaF and by 5'-guanylylimidodiphosphate, but not by guanosine-5'-triphosphate (50 μM). The acid secretory inhibitors prostaglandin E_1 (100 μM), epinephrine (50 μM), secretin (0.2 μM), and glucagon (20 μM) all stimulated mucosal membrane adenylyl cyclase activity from the stomach corpus. The gastric acid secretagogues pentagastrin (20 μM), histamine (1 mM), or carbachol (1 mM) had no effect on basal or prostaglandin E_1-stimulated adenylyl cyclase activity. The enzyme exhibited Michaelis-Menten kinetics with respect to the concentration of ATP, having an apparent Km of 0.25 mM. Histamine did not stimulate rat mucosal adenylyl cyclase activity under a variety of experimental conditions (i.e., tissue from fed and fasted animals, different homogenization media, use of whole homogenate versus different cell fractions, and *in vitro* additives with histamine); however, it did stimulate the same enzyme in guinea pig gastric fundic mucosa, an enzyme also activated by prostaglandin E_1. These studies do not support the hypothesis that cyclic AMP mediates the actions of gastric acid secretagogues on the parietal cell in the rat.

4559 ROLE OF ENDOGENEOUS CALCITONIN IN THE SECRETION OF GASTRIN AND GASTRIC ACID IN RATS. (Eng.) Ito, H.; Sakurada, T.; Orimo, H. (Tokyo Metropolitan Geriatric Hosp., 35-2 Sakae-cho, Itabashi-ku, Tokyo, Japan). *Horm. Metab. Res.* 9(1):89-92; 1977.

The physiological role of calcitonin on gastric acid secretion and on serum gastrin was studied in male Wistar rats. The accumulation of gastric acid in pylorus-ligated animals with or without thyroidectomy (76 ± 3 and 44 ± 4 μEq/2 hr, resp.) was significantly greater than in nonligated controls (28 ± 5 μEq/2 hr, $p<0.001$). The accumulation of gastric acid following the pyloric ligation was significantly greater in the thyroidectomized rats than in the thyroid intact rats ($p<0.001$). Serum immunoreactive gastrin levels in the pylorus ligated rats with thyroidectomy (132 ± 14 pg/ml) and without thyroidectomy (85 ± 8 pg/ml) were significantly greater than in the nonligated animals (45 ± 7 pg/ml, $p<0.01$). Serum calcium levels were not significantly different in the three groups. Eight animals underwent parathyroid autotransplantation to the femoral muscle; 2 weeks later, they were sham-operated or thyroidectomized. Both groups were given glycine (50 mg/100 g) as a 10% solution by stomach tube. Serum immunoreactive gastrin levels increased significantly at 30 and 60 min after glycine administration, and this level was significantly higher in the thyroidectomized rats at 30 min ($p<0.02$) and 60 min ($p<0.05$). In eight similarly treated animals that received rat chow homogenate instead of glycine through the stomach tube, serum immunoreactive gastrin levels at 30 min after the ingestion of rat chow was significantly higher in the thyroidectomized animals. The results suggest that endogenous calcitonin has an inhibitory action on gastric acid secretion, probably through the inhibitory action on gastrin secretion in rats.

4560 GASTRIC AND EXTRAGASTRIC GASTRIN RELEASE IN NORMAL SUBJECTS, IN DUODENAL ULCER PATIENTS, AND IN PATIENTS WITH PARTIAL GASTRECTOMY (BILLROTH I). Fritsch, W. P.; Hausamen, T. U.; Rick, W. (I. Medizinische Klinik A, Universitat Dusseldorf, W. Germany). *Gastroenterology* 71(4): 552-557; 1976.

Gastrin release after p.o. and intraduodenal stimulation (test meal) was examined in 10 normal subjects, 32 patients with duodenal ulcer, and 11 patients with gastroduodenostomy (Billroth I) without vagotomy. In addition, the effect of extragastric gastrin on gastric acid secretion was investigated. The mean serum gastrin levels rose from fasting levels of 43, 72, and 38 pg/ml in the normal, duodenal ulcer, and gastroduodenostomy patients to peak concentrations of 110, 201, and 61 pg/ml ($p<0.0025$, 0.005, and 0.05), resp., after the oral test meal. These levels also rose significantly after an intraduodenal test meal from basal levels of 49, 61, and 33 pg/ml in the normal, duodenal ulcer, and gastroduodenostomy patients, resp., to 77, 117, and 64 pg/ml. After the intraduodenal test meal an increase in gastric acid secretion and serum gastrin was observed in four normal subjects and 17 duodenal ulcer patients. In the basal state, after an intraduodenal or p.o. test meal, duodenal ulcer patients with normal gastric acid secretory capacity had higher serum gastrin concentrations than duodenal ulcer patients with gastric hypersecretion. There was a good correlation between peak serum gastrin levels after the p.o. and after the intraduodenal meals. It is concluded that: (a) intraduodenal application of a test meal results in release of gastrin from extragastric sites; (b) extragastric gastrin is biologically active, and (c) duodenal ulcer patients are able to release more antral and more extragastric gastrin in response to a test meal.

4561 ON THE SYNTHESIS OF PROSTAGLANDINS BY HUMAN GASTRIC MUCOSA AND ITS MODIFICATION BY DRUGS. (Eng.) Peskar, B. M. (Medizinische Klinik, Univ. Freiburg, D-78 Freiburg i.Br., W. Germany). *Biochim. Biophys. Acta* 487(2):307-314; 1977.

Specific radioimmunoassays for prostaglandins E_2, A_2, and $F_{2\alpha}$ were used to study the synthesis of prostaglandins by gastroscopically obtained small biopsy specimens of human gastric corpus mucosa. Both prostaglandin E_2 and prostaglandin $F_{2\alpha}$ were found to be synthesized from arachidonic acid by the microsomal fraction of human gastric mucosa. The synthesis of prostaglandin E_2 exceeded that of prostaglandin $F_{2\alpha}$ by a factor of about 10. Prostaglandin A_2 or B_2 synthesis was not observed under the same incubation conditions. Indomethacin effectively inhibited synthesis of both prostaglandin E_2 (ID_{50}, 4.2 μg/ml) and prostaglandin $F_{2\alpha}$ (ID_{50}, 1.8 μg/ml) by human gastric mucosa, while paracetamol even in a concentration of 310 μg/ml did not influence prostaglandin synthesis. Carbenoxolone at the same concentration only inhibited prostaglandin synthesis by about 20%. The results support the hypothesis that the gastrointestinal effects or side-effects of several drugs are mediated by an influence on the enzymes of prostaglandin synthesis or inactivation.

4562 INFLUENCE OF THE ROUTE OF ADMINISTRATION OF PROSTAGLANDIN E_1 ON RAT GASTRIC SECRETION.

(Eng.) Hong, E.; Lopez, C. (Instituto Miles de Terapeutica Experimental, Calzada Xochimilco 77, Mexico 22, D.F., Mexico). *Prostaglandins* 13(4):691-696; 1977.

The effects of subcutaneous, intraduodenal, and intragastric administration of prostaglandin E_1 (PGE_1) upon gastric secretion in pylorus-ligated rats were compared. Male Wistar rats were fasted for 48 hr prior to the experiment, pylorus ligation was performed, and PGE_1 was administered immediately. Gastric secretion was measured 4 hr later. Subcutaneous injection of PGE_1 produced dose-related decreases in gastric acid secretion and volume that were greater than, but parallel to, those produced by intraduodenal administration of PGE_1. The ED_{50}'s for inhibiting acid secretion and volume by s.c. administration were 1.3 and 1.6 mg/kg, while the ED_{50}'s for inhibition by intraduodenal administration were 19.0 and 20.9 mg/kg, resp. Intragastric administration resulted in a dose-related increase in volume (ED_{50}=22.2 mg/kg) and a dose-related decrease in acid (ED_{50}=14.8 mg/kg). The dose-response curve for intragastric administration had a slope of only 7.2 while the slopes observed with s.c. and intraduodenal administration were 26.9 and 23.8, resp. The authors propose that PGE_1 may be less effective when administered intraduodenally than when administered s.c. due to a greater metabolism of PGE_1 during absorption from the intestines or to a less efficient absorptive process from the duodenum. The increase in volume after intragastric administration might be explained by an increased blood flow from the capillaries, possibly due to localized inflammation. PGE_1 administered intragastrically may also act directly on the oxyntic cells to decrease acid secretion.

4563 GASTRIC ANTISECRETORY EFFECTS OF E PROSTAGLANDINS IN RHESUS MONKEYS.

(Eng.) Dajani, E. Z.; Callison, D. A.; Bianchi, R. G.; Driskill, D. R. (Dept. Biological Res., Searle Lab., Box 5110, Chicago, IL 60680). *Am. J. Dig. Dis.* 21(12):1020-1028; 1976.

Prostaglandin E_1 methyl ester (PGE_1ME) and E_2 (PGE_2 were tested for antagonistic action on histamine an pentagastrin-stimulated gastric secretion in female rhesus monkeys (*Macaca mulatta).* Histamine (0.1 mg kg) or pentagastrin (15 μg/kg) was injected s.c. in conscious monkeys at four 1-hr intervals to stimulate secretion to 69% or 100% of the predetermined maximal response, resp. When a plateau was reached the prostaglandins (10-100 μg/kg) were injected i.v in a single bolus. Gastric secretion was aspirated at 0.5-hr intervals and analyzed for volume, acid content, and ion concentrations. PGE_1ME inhibited basal and histamine/pentagastrin-stimulated gastric secretion, and PGE_2 inhibited histamine-stimulated gastric secretion. Gastric acid concentration was inhibited ($p<0.05$) for at least 1 hr with doses of 10 μg/kg PGE_1ME and 30 μg/kg PGE_2. The volume of histamine-stimulated gastric fluid secretion was significantly depressed ($p<0.05$) only by 100-μg/kg doses of either prostaglandin. Both reduced hydrogen ion output and increased gastric sodium ion concentrations, but chloride and potassium ion concentrations were not altered. The gastric secretor responses of the rhesus monkey appear to be similar to those of man, and the monkeys lacked the severe side effects seen in other animals in response to prostaglandins. The rhesus monkey is concluded to be an adequate species for studying the gastric anti-secretory effects of prostaglandins.

4564 THE EFFECT OF THE SYNTHETIC PROSTAGLANDI ANALOG 15 (R) 15 METHYL-PGE_2 METHYL ESTE ON GASTRIC MUCOSAL HEMORRHAGE INDUCED IN RATS BY TAUROCHOLIC ACID AND HYDROCHLORIC ACID.

(Eng.) Carmichael, H. A.; Nelson, L.; Russell, R. I.; Lyon, A.; Chandra, V. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Am. J. Dig. Dis.* 22(5):411-414; 1977.

The incidence of mucosal hemorrhage induced in Sprague-Dawley rats by the p.o. administration of taurocholic acid (TCA) and hydrochloric acid (HCl), both singly and in combination, was investigated. The effect of prostaglandin 15 (R) 15 methyl-PGE_2 methyl ester (Me-PGE_2) on the occurrence of hemorrhage induced by TCA with HCl was also studied. The incidence of hemorrhage induced by TCA (10 mM) alone and HCl (160 mM) alone was minimal and simila to that induced by the control solution. The combination of TCA (10 mM) and HCl (160 mM) produced bleeding in 67.7% of animals. The addition of Me-PGE_2 (9.9 μM, corresponding to 50 μg/kg) significantly reduced the incidence of hemorrhage induced by the combination of TCA with HCl from 67.7% to 31.3%. This result suggests that this synthetic prostaglandin may be of value in conditions thought to be associated with reflux of bile into the stomach.

4565 THE POSSIBLE MECHANISM FOR THE 'FADE' IN ACID GASTRIC SECRETION DURING CONTINUOUS INFUSIONS OF PENTAGASTRIN.

(Eng.) Sanyal, A. K.;

Waton, N. G. (Dept. Physiology and Pharmacology, Univ. Strathclyde, Glasgow, G1 1XW, Scotland). *J. Physiol.* 261(2):445-451; 1976.

The "fade" phenomenon seen in acid gastric secretion in response to a continuous i.v. infusion of pentagastrin was studied in eight anaesthetized cats in 3-hr infusion experiments. The results were expressed as percentage of the total 3-hr secretion observed at the 15-min sampling intervals. Continuous infusion of histamine produced a steady increase in acid secretion up to a maximum at 3 hr (11.5 ± 1.0%). However, pentagastrin infusion led to a steep rise in acid secretion to a maximum at 45 min (12.1 ± 1.5%) and then gradually decreased for 2 hr to reach about 60% (6.2 ± 0.6%) of the maximum. Pretreatment of the cats with drugs that block or deplete 5-hydroxytryptamine (5-HT) methysergide (1.0 mg/kg), cyproheptadine (0.4 mg/kg), or reserpine (0.1 mg/kg), resulted in an acid secretion response to pentagastrin similar to that seen during infusion of histamine. These drugs did not affect secretion stimulated by histamine. The results suggest that the "fade" phenomenon is due to a release of 5-HT from the tissues stimulated by pentagastrin. It is suggested that 5-HT first potentiates and then inhibits the resulting stimulated secretion.

4566 MUCINOUS SECRETION FROM CANINE HEIDENHAIN POUCH AFTER STIMULATION WITH FOOD, PENTAGASTRIN AND HISTAMINE.

(Eng.) Kowalewski, K.; Pachkowski, T.; Secord, D. C. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2N8, Canada). *Eur. Surg. Res.* 8(6):536-544; 1976.

Principal glycoproteins and amino acids were determined in the gastric juice obtained from Heidenhain pouches of dogs after stimulation with food, histamine (1 mg/kg, at 0, 2, and 4 hr of the 6-hr collection period), or pentagastrin (6 μg/kg, at hr 0, 2, and 4). All stimulants induced voluminous secretion, and histamine was the best stimulant. In both the fasting secretion and in the three types of stimulated secretion, the galactose to glucosamine ratio was close to 1:1, and the galactose to galactosamine ratio approached 2:1. The concentrations of all carbohydrate components (i.e., galactose, glucosamine, galactosamine, fucose, and mannose) with the exception of glucose were higher in nonstimulated fasting secretions than in stimulated secretions ($p<0.01$). The concentrations of galactose, glucosamine, galactosamine, glucose, and fucose were found in significantly lower concentrations in histamine-stimulated secretions than in secretions obtained after feeding ($p<0.05$) or pentagastrin ($p<0.05$). Proline, leucine, glutamic acid, and aspartic acid were the principal amino acids in all four groups of gastric juice hydrolysates. The threonine to serine ratios were close to 1:1, and threonine and serine contributed only 11-20% of the amino acids. Threonine, serine, proline, alanine, and glycine accounted for 35-40% of the total amino acids. These results differ considerably from the relative concentrations of amino acids and carbohydrates found in human gastric juice, but this may be due to species differences.

4567 EFFECT OF HISTAMINE ON CANINE GASTRIC MUCOSAL ADENYLATE CYCLASE.

(Eng.) Dozois, R. R.; Wollin, A.; Rettmann, R. D.; Dousa, T. P. (Mayo Clinic, Rochester, MN 55901). *Am. J. Physiol.* 232(1):E35-E38; 1977.

Evidence that histamine stimulates the adenylate cyclase of isolated gastric mucosal preparations was sought to fill in the missing link in the sequence of associations of cyclic AMP with HCl secretion. The effects of histamine, N^{α}-dimethylhistamine, 4,5-methylhistamine, N^{τ}-methylhistamine, pentagastrin, carbachol, and NaF on the adenylate cyclase activity from canine gastric mucosa were investigated in cell-free preparations. In gastric fundic mucosa, histamine (10^{-4} M), N^{α}-dimethylhistamine (10^{-4} M), 4,5-methylhistamine (10^{-4}M), and NaF (10^{-2} M) significantly ($p<0.001$) increased adenylate cyclase activity by 44.7% ± 6.6%, 49.4% ± 6.7%, 34.0% ± 6.4%, and 572.0% ± 100%, resp., above basal activity. The effect of histamine and Nα-dimethylhistamine was dose-dependent. In contrast, other tested agents failed to stimulate the formation of cyclic AMP in gastric fundic mucosa. Metiamide (10^{-4} M) blocked the stimulation of fundic mucosa adenylate cyclase by histamine and Nα-dimethylhistamine without significantly altering basal and NaF-induced adenylate cyclase activity. Histamine, however, did not stimulate the adenylate cyclase activity from the gastric antral mucosa. The canine gastric acid response to histamine may be mediated by cyclic AMP formed in response to stimulation of histamine H_2-receptors.

4568 HYPEROSMOTIC OXIDATION OF GLUCOSE AND DECARBOXYLATION OF HISTIDINE IN THE GASTRIC MUCOSA.

(Eng.) Sernka, T. J.; Jackson, A. F. (Wright State Univ. Sch. Medicine, P. O. Box 927, Dayton, OH 45401). *Physiol. Chem. Phys.* 8(4):309-317; 1976.

The metabolic effects of the physiological reactions of the gastric mucosa to hyperosmotic agents were studied. Paired slices of rat gastric mucosa were incubated with labeled glucose or histidine in isosmotic solution or threefold hyperosmotic solutions concentrated in NaCl, KCl, or ethanol. The rate of $(1-^{14}C)$-glucose oxidation to $^{14}CO_2$ in isosmotic solution was reduced by 74% in hyperosmotic NaCl and by 28% in hyperosmotic KCl. The rate of $(6-^{14}C)$-glucose oxidation to $^{14}CO_2$ in isosmotic solution was reduced by 64% in hyperosmotic NaCl and by 53% in hyperosmotic KCl. Reductions of glucose oxidation in hyperosmotic ethanol were not significant. The ratio of $^{14}CO_2$ formed from $(1-^{14}C)$-glucose to that formed from $(6-^{14}C)$-glucose was not significantly changed by hyperosmotic NaCl or ethanol, but was significantly raised by hyperosmotic KCl. The rate of (carboxyl-^{14}C)-histidine decarboxylation in isosmotic solution was reduced significantly by 48% in hyperosmotic NaCl, by 30% in hyperosmotic KCl, and by 27% in hyperosmotic ethanol. It is concluded that hyperosmotic solutions reduce glucose oxidation and histidine decarboxylation by rat gastric mucosa in the order of potency: NaCl>KCl>ethanol. Thus hyperosmotic solutions inhibit the source of metabolic energy for stimulated acid secretion, the citric acid cycle, and the formation of the secretagogue histamine.

4569 EFFECT OF GRADED MECHANICAL ISCHEMIA ON OXYGEN TENSION AND ELECTRICAL POTENTIAL IN THE CANINE GASTRIC MUCOSA: A NEW EXPERIMENTAL MODEL. (Eng.) Bowen, J. C.; Garg, D. K. (Ochsner Clinic, 1514 Jefferson Highway, New Orleans, LA 70121). *Gastroenterology* 73(1):84-88; 1977.

The applicability of an ultramicroelectrode technique to the study of the gastric mucosa was tested, and the effect of change in total gastric blood flow on mucosal oxygen tension (PO_2) and membrane potential difference (PD) was studied using this technique. Oxygen tension and PD were measured in the gastric mucosa of anesthetized dogs while total blood flow and arteriovenous oxygen content difference were measured. In the control period, measurements were: gastric blood flow, 102.4 ± 3.0 ml/min/100 g tissue; calculated oxygen consumption, 2.4 ± 0.1 ml/min/100 g tissue; intracellular oxygen tension, 15.0 ± 0.6 mm Hg; and intracellular PD, -50.8 ± 1.5 mV. When gastric blood flow was reduced 50% by tourniquet ischemia, oxygen tension decreased 20% ($p<0.05$), but electrical potential and oxygen consumption did not change. When blood flow was reduced 75%, oxygen tension and PD decreased significantly (60% and 35%, resp.), but oxygen consumption was unchanged. Zero blood flow reduced oxygen tension, electrical potential, and total oxygen consumption to zero; release of the arterial tourniquet allowed them to return to control levels. The critical oxygen tension at which the electromotive force generated by the gastric mucosal cells was reduced averaged 9 mm Hg. This result suggests that safety factors exist in the gastric circulation that permit a 60% reduction in total gastric blood flow to occur before an insufficiency of intracellular oxygen begins to limit cellular metabolism within the mucosa.

4570 ION SELECTIVE EFFECTS OF SALICYLATE ON ANTRAL MUCOSA. (Eng.) Fromm, D. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 71(5):743-749; 1976.

The effects of luminal salicylate (5 mM) on rates of ion transport were investigated in isolated rabbit antral mucosa. At neutral luminal pH, salicylate increased Na permeability (mucosa to serosa, Δ 1.1 ± 0.2 $\mu Eq/hr/cm^2$, $p<0.001$; serosa to mucosa, Δ 0.9 ± 0.1 $\mu Eq/hr/cm^2$, $p<0.001$) and decreased Cl permeability (mucosa to serosa, Δ -1.1 ± 0.4 $\mu Eq/hr/cm^2$, $p<0.01$; serosa to mucosa, Δ -3.6 ± 0.4 $\mu Eq/hr/cm^2$, $p<0.001$). Salicylate did not alter net Na transport significantly but decreased the net Cl secretion (2.4 ± 0.3 $\mu Eq/hr/cm^2$). At luminal pH 4, the effects of salicylate were arbitrarily divided into two phases. The initial phase was associated with an increase in Na and marked decrease in Cl permeability. Subsequently, a greater increase in Na permeability and a marked increase in Cl permeability occurred. Active Na transport persisted in the presence of salicylate at pH 4. Indirect evidence also suggested that Cl secretion persisted
under these conditions, but at a reduced rate. Th
rate of luminal acid loss also increased in the
presence of salicylate. A fourfold increase in sa
icylate concentration or a decrease in luminal pH
from 4 to 3 did not appear to intensify the effect
observed for 5 mM salicylate at pH 4. The increas
in cation and decrease in anion permeability obser
at neutral pH and initially at pH 4 are compatible
with an influence of the negative charge of the
salicylate anion. The subsequent changes observed
in the presence of acid also are compatible with t
concept that as the mucosa becomes overwhelmed wit
acid, a nonspecific increase in permeability occur
However, the effect of salicylate on active Cl tra
port is largely independent of acid diffusing into
the mucosa.

4571 ENDOGENOUS SEROTONIN IN THE CONTROL OF GASTRIC ACID SECRETION. (Eng.) Jaffe, B. M.; Kopen, D. F.; Lazan, D. W. (Dept. Surgery, Washington Univ., 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 82(1):156-163; 1977.

The possible role of serotonin in the duodenal con
trol of gastric acid secretion was evaluated by
comparing the ability of endogenous and exogenous
serotonin to inhibit gastric secretion and escape
hepatic inactivation. In three dogs with Heidenhain pouches (HP), gastric fistulas (GF), and
duodenal cannulas, acidification of the duodenum
with 0.1 N HCl (5 ml/min) resulted in significant
inhibition of GF output (preacidification, 8.66
± 0.58 mEq/30 min; postacidification, 5.47 ± 0.66
mEq/30 min) and elevated peripheral venous blood
levels of serotonin (basal, 226 ± 64 ng/ml; peak,
521 ± 168 ng/ml). Infusion of exogenous serotonin
to comparable blood levels (basal, 208 ± 38 ng/ml;
mean postacidification, 571 ± 153 ng/ml) resulted
in similar GF inhibition (preacidification, 9.17 ±
0.92 mEq/30 min; postacidification, 6.49 ± 0.56 mE
30 min). Per 1 ng/ml increment in peripheral bloo
serotonin, endogenous serotonin inhibited 54.59 ±
12.99 $\mu Eq/hr$ and exogenous serotonin inhibited 46.
± 10.39 $\mu Eq/hr$, ($p<0.05$). Neither endogenously
released nor exogenous serotonin inhibited HP acid
output. Using mesenteric venous infusions of
serotonin, significant amounts of immunoreactive
serotonin were found to escape hepatic inactivatio
basal peripheral venous levels of serotonin, 233 ±
103 ng/ml, increased to 455 ± 127 ng/ml at 10 min.
During endogenous serotonin release, 92 ± 21% of p
venous serotonin was bound to platelets; in contrast, during intraportal serotonin infusion, only
59 ± 18% of serotonin was platelet-bound. The
ability of exogenously administered serotonin to
reproduce the actions of the endogenously released
molecule identically supports the contention that
serotonin plays a major role in the intestinal con
trol of gastric acid secretion.

4572 MECHANISM OF INHIBITION OF GASTRIC ACID SECRETION BY HYPERTONIC SOLUTIONS AND VASOPRESSIN. (Eng.) Limlomwongse, L.; Nophakoon, J.; Thithapandha, A. (Dept. Physiology, Mahidol

Univ., Rama VI Rd., Bangkok 4, Thailand). *Pfluegers Arch.* 366(2/3):159-165; 1976.

The mechanism by which hyperglycemia, hypertonic solutions, and vasopressin affect gastric acid secretion and mucosal blood flow (MBF) was studied in female Fischer rats. Infusion of isotonic saline did not alter acid output and gastric clearance of aminopyrine, whereas hypertonic solutions (20% glucose or 3% NaCl) significantly increased plasma osmolality and decreased acid secretion. With glucose, the gastric volume, free HCl secretory rate and HCl concentration were reduced from 0.28 ± 0.01 to 0.18 ± 0.02 ml/15 min ($p<0.001$), 38.0 ± 2.5 to 19.2 ± 2.1 µEq/g stomach/15 min ($p<0.001$), and 135 ± 4 to 111 ± 7 µEq/ml ($p<0.01$), resp. With NaCl, the corresponding figures were 0.33 ± 0.01 to 0.16 ± 0.01 ml/15 min ($p<0.001$), 37.6 ± 1.9 to 18.2 ± 1.6 µEq/g/15 min ($p<0.001$), and 129 ± 1 to 120 ± 3 µEq/ml ($p<0.01$), resp. Vasopressin at low concentrations (10-1,000 µIU/100 g, i.v.) did not significantly affect gastric secretion. However, higher concentrations (5, 10, 25 mIU/100 g) progressively and significantly reduced acid output. Both hypertonic solutions and vasopressin significantly reduced the MBF, as determined by aminopyrine clearance. Aminopyrine clearance was reduced from 4.7 ± 0.3 to 2.7 ± 0.2 ml/15 min ($p<0.001$) by a single dose of 20% glucose, from 4.9 ± 0.4 to 2.2 ± 0.3 ml/15 min ($p<0.001$) by 3% NaCl, and from 7.1 to 0.8 to 2.6 ± 0.5 ml/15 min ($p<0.001$) by 25 mU vasopressin. However, the ratio of MBF to gastric secretory rate did not significantly change when either the hypertonic solutions or vasopressin was infused. It is concluded that all three agents probably have a direct action on secretion rather than on decreasing MBF.

4573 EFFECT OF PROXIMAL GASTRIC VAGOTOMY ON GASTRIC ACID HYPERSECRETION AND HYPERGASTRINEMIA AFTER MASSIVE SMALL BOWEL RESECTION IN DOGS.

(Eng.) Wolf, S. A.; Dozois, R. R.; Go, V. L. W.; Telander, R. L. (Mayo Clinic, 200 First St. S.W., Rochester, MN 55901). *Surgery* 81(6):627-632; 1977.

To study the effects of proximal gastric vagotomy on acid hypersecretion and hypergastrinemia, fasting and postprandial gastric acid secretion and gastrin were determined in Heidenhain pouch dogs before (C) and after (R) massive enterectomy (5 dogs) and after additional proximal gastric vagotomy (PGV, 3 dogs). Basal acid output was unchanged (C=7 ± 2 µEq/hr; R=11 ± 4 µEq/hr), but postprandially the hourly (3rd-8th hr) and cumulative outputs (C=3.6 ± 0.3 mEq/8 hr; R=7.2 ± 0.4 mEq/8 hr) were significantly increased by resection ($p<0.001$). Similarly, fasting gastrin was unaltered by resection (C=41 ± 2 pg/ml; R=46 ± 8 pg/ml), whereas hourly gastrin concentrations significantly ($p<0.05$) exceeded control values. Increased gastrin correlated linearly ($p<0.02$) with increased acid output. After PGV, basal acid levels remained unchanged (R=4 ± 2 µEq/hr; PGV=9 ± 4 µEq/hr), but postprandial acid output significantly exceeded prevagotomy values at all time periods ($p<0.05$). Cumulative acid output also was increased (R=6.8 ± 0.6 mEq/8 hr; PGV=11.2 ± 0.6 mEq/8 hr; $p<0.001$). Serum gastrin, however, remained unchanged. Hypersecretion of acid from Heidenhain pouches after massive enterectomy is increased further by PGV without a concomitant increase in serum gastrin.

4574 THE EFFECT OF STRESS ON THE GASTRIC MUCOSAL BARRIER IN RATS.

(Eng.) Werther, J. L.; Horowitz, I. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Proc. Soc. Exp. Biol. Med.* 154(3):415-417; 1977.

Acid was instilled in the pylorus-ligated stomachs of male Sprague-Dawley rats subjected to restraint stress to gain information on the role of the gastric mucosal barrier to back-diffusion of hydrogen ions in the pathogenesis of stress ulceration. Test solutions containing a hydrogen ion concentration of 55 mEq/l were used. Hydrogen ion secretion did not decrease in these stressed rats, but there was a significant increase in H^+ back-diffusion across the gastric mucosa ($p<0.001$), which was well correlated with the gross mucosal damage ($r=+0.88$). In rats with a mean back-diffusion level of only -10.65 ± 9.73 µEq/hr, only erythema was present. Rats with a mean H^+ back diffusion level of -40.36 ± 7.87 µEq/hr had moderate ulceration, and rats with the highest H^+ level (-66.10 ± 17.13 µEq/hr) had the most severe ulceration. Abnormal gastric mucosal permeability to hydrogen ion may play a pathogenic role in restraint-stress-induced ulceration.

4575 LOCALIZATION OF A GASTRIC H^+ PUMP COMPONENT [Abstract].

(Eng.) Sachs, G.; Mihas, A.; Crago, S.; Saccomani, G. (Lab. Membrane Biology, Univ. Alabama Birmingham, Birmingham, AL). *Gastroenterology* 72(5, Part 2):1125; 1977.

4576 CELL RENEWAL VS. MUCUS SECRETION IN HUMAN GASTRIC EPITHELIUM: BALANCE AND IMBALANCE [Abstract].

(Eng.) Gheorghiu, Th.; Klein, H. J. (Medizinische Universitatsklinik, Koln, W. Germany). *Rend. Gastroenterol.* 9(1):73; 1977.

4577 A METABOLIC HYPOTHESIS FOR THE STIMULATION OF GASTRIC ACID SECRETION [Abstract].

(Eng.) Sernka, T. J. (Wright State Univ. Sch. Medicine, Dayton, OH). *Gastroenterology* 72(5, Part 2):1129; 1977.

4578 GASTRIC INHIBITORY POLYPEPTIDE IN GASTROINTESTINAL DISORDERS [Abstract].

(Eng.) Creutzfeldt, W.; Ebert, R.; Arnold, R. (Medizinische Klinik und Poliklinik der Universitat, Gottingen, W. Germany). *Rend. Gastroenterol.* 9(1):64; 1977.

4579 EFFECT OF GRADED INCREASES IN INTRAGASTRIC PRESSURE ON GASTRIN RELEASE AND ACID SECRETION IN INTACT DOGS [Abstract].

(Eng.) Strunz, U. T.; Grossman, M. I. (Veterans Admin. Wadsworth

Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1137; 1977.

4580 ROLE OF GASTRIN IN NORMAL AND ABNORMAL GASTRIC ACID SECRETION [Abstract]. (Eng.) Walsh, J. H. (Dept. Medicine, Univ. California, Los Angeles, CA). *Rend. Gastroenterol.* 9(1):61; 1977.

4581 EFFECT OF ACUTE ADMINISTRATION OF HYDROCORTISONE ON SERUM GASTRIN IN MAN [Abstract]. (Eng.) Marletta, F.; Catalano, F.; Daniele, S.; Scollo, L.; Blasi, A. (Cattedra di Gastroenterologia dell'Universita, Catania, Italy). *Rend. Gastroenterol.* 9(1):60; 1977.

4582 EFFICACY OF A NEW PROSTAGLANDIN ANALOG O GASTRIC SECRETION [Abstract]. (Eng.) Wilson, D. E.; Chang, I. W.; Raiser, M. (Dept. Medicine, Univ. Illinois, Chicago, IL). *Gastroenterology* 72(5, Part 2):1150; 1977.

See also, 4487, 4489, 4494, 4495, 4502, 4591, 4592
4683, 4685, 4701, 4716, 4721, 4811, 4831
4833, 4834, 4836, 4854, 4856, 4859, 4861
4862, 4863, 4912, 5177.

SECRETION AND METABOLISM

Pancreas

4583 SYNTHESIS AND SUBCELLULAR DISTRIBUTION OF HEPARAN SULFATE IN THE RAT EXOCRINE PANCREAS. (Eng.) Kronquist, K. E.; Elmahdy, A.; Ronzio, R. A. (Johns Hopkins Univ. Sch. Medicine, 725 North Wolfe St., Baltimore, MD 21205). *Arch. Biochem. Biophys.* 182(1):188-196; 1977.

Sulfate-labeled macromolecules synthesized by rat pancreas *in vitro* were isolated, the material was characterized biochemically, and its role in secretion was studied by investigating its subcellular distribution. Tissue fragments and isolated acinar cells from adult Sprague-Dawley rat pancreas rapidly incorporated inorganic $^{35}SO_4{}^{2-}$ into macromolecules. Secretion of labeled macromolecules was stimulated by carbamylcholine chloride. The principal sulfated product synthesized by isolated acinar cells was purified by diethylaminoethyl cellulose chromatography and was identified as heparan sulfate by digestion with purified heparitinase and by deaminative cleavage with nitrous acid. The results of subcellular fractionation of pancreas tissue labeled *in vitro* with $^{35}SO_4{}^{2-}$ showed that sulfate-containing macromolecules were present both in soluble fractions and as tightly bound membrane components. Zymogen granules contained 14% of the total radioactivity incorporated; zymogen granule membranes, 3%; the soluble zymogen granule contents, 7%; microsomes, 30%; mitochondria, 14%; and the postmicrosomal supernate, 25%. Purified $^{35}SO_4{}^{2-}$-labeled zymogen granule membranes had the highest specific radioactivity of any fraction examined. Degradative analysis with nitrous acid indicated that the major sulfated product present in all of the subcellular fractions was heparan sulfate.

4584 PANCREATIC DUCT OBSTRUCTION WITH AN ACRY ATE GLUE: A NEW METHOD FOR PRODUCING PA CREATIC EXOCRINE ATROPHY. (Eng.) Little, J. M.; Lauer, C.; Hogg, J. (Dept. Surgery, Univ. Sydney, Sydney, N.S.W. 2006 Australia). *Surgery* 81(3):243 249; 1977.

The feasibility of producing pancreatic exocrine atrophy with alkyl-alpha-cyanoacrylate glue was tested in 10 healthy dogs. The glue (1.0 ml) was injected under very low pressure into the main pancreatic duct, and the dogs were killed at month intervals up to 7 months postoperatively. This technique led to a reproducible pancreatic atrophy with preservation of the islets. No significant changes were noted in the serum electrolytes, creatinine, proteins, or bilirubin. A 10- to 15-fold rise in serum amylase was noted in each dog o the first postoperative day, but by 3 weeks, this value had returned to the preoperative level. No animal was diabetic, and by a mean period of 4 months postoperatively, the mean weight of the seven dogs maintained for this length of time had increased to the preoperative level. No evidence of chronic pancreatitis was observed at the autops This technique may be useful in the management of human chronic pancreatitis as an alternative to pancreatic resection.

4585 THE EFFECT OF DIBUTYRYL CYCLIC ADENOSINE 5'-MONOPHOSPHATE ON PROTEIN SECRETION FR THE RAT EXOCRINE PANCREAS IN VITRO. (Eng.) Fast, D.; Tenenhouse, A. (Pathophysiologische Institut, Universitat Bern, Bern, Switzerland). *Br. J. Pharmacol.* 58(4):605-612; 1976.

The mechanism by which dibutyryl cyclic AMP potentiates the secretory effect of carbachol was investigated in Wistar rat exocrine pancreas. The pancreases were incubated with 0.5 μCi/ml ^{45}Ca and nonradioactive $CaCl_2$ (5×10^{-6}, 5×10^{-5}, or 5×10^{-4} M). Dibutyryl cyclic AMP (10^{-3} M) potentiated the secretory effect of carbachol only at carbachol concentrations of 10^{-7} M or greater. At 5×10^{-6} M Ca^{2+}, the degree of potentiation was 4.5 and 3.5 for 10^{-6} M and 10^{-4} M carbachol, resp.; at 5×10^{-5} M Ca^{2+} it was 1.2 and 1.4 for these concentrations of carbachol; and at 5×10^{-4} M Ca^{2+}, it was 0.5 and 0.9. Carbachol increased, and dibutyryl cyclic AMP reduced, the rate of ^{45}Ca efflux from the tissue. The ionophore A-23187 stimulated ^{3}H-protein release in the presence of Ca^{2+}, and this effect was potentiated by dibutyryl cyclic AMP; the degree of potentiation was inversely proportional to extracellular concentration of Ca^{2+}. At 10^{-3} M Ca^{2+}, the potentiation occurred only at ionophore concentrations of 10^{-6} M or less. These results support the hypothesis that dibutyryl cyclic AMP potentiates the effect of secretagogues in rat exocrine pancreas by maintaining an elevated intracellular calcium concentration (by inhibiting Ca^{2+} efflux). The results also suggest that the limiting factor in carbachol-stimulated secretion is the intracellular Ca^{2+} concentration.

4586 EFFECTS OF CATECHOLAMINES AND THEIR INHIBITORS ON THE ISOLATED CANINE PANCREAS. I. NORADRENALINE AND ISOPRENALINE. (Eng.) Vaysse, N.; Bastie, M. J.; Pascal, J. P.; Martinel, C.; Fourtanier, G.; Ribet, A. (CHU Rangueil L3, 31400 Toulouse, France). *Gastroenterology* 72(4):711-718; 1977.

The effects of the α adrenergic agonist noradrenalin (2, 20, and 200 μg) and antagonist phenoxybenzamine (15 mg) and of the β adrenergic agonist isoproterenol (2, 20, and 200 μg) and antagonist propranolol (6 mg) were tested on isolated perfused canine pancreas. These effects were compared under basal conditions and under stimulation by a background of secretin (0.5 clinical U/hr) or of cerulein (600-1,200 ng/hr). Noradrenalin induced a strong vasoconstriction (inhibited by phenoxybenzamine), followed by a moderate vasodilation (possibly mechanical). Noradrenalin did not stimulate a resting pancreas and inhibited a pancreas from secreting in response to secretin or cerulein. After phenoxybenzamine, in the absence of vasoconstriction, this latter effect was reversed into a dose-dependent stimulation of hydrelatic secretion, suggesting that noradrenalin had a direct action on the secretory cell. There was no stimulation of protein and no acinar degranulation. Propranolol and atropine did not modify the effectiveness of noradrenalin. Isoproterenol had a weak vasodilatory effect but no effect on the secretion. Adrenergic blocking agents did not alter the response to secretin or cerulein.

4587 EFFECTS OF CATECHOLAMINES AND THEIR INHIBITORS ON THE ISOLATED CANINE PANCREAS. II. DOPAMINE. (Eng.) Bastie, M. J.; Vaysse, N.; Brenac, B.; Pascal, J. P.; Ribet, A. (CHU Rangueil L3, 31400 Toulouse, France). *Gastroenterology* 72(4):719-723; 1977.

The effects of dopamine on the isolated perfused canine pancreas and the possible interaction between secretin and dopamine in the stimulation of water and bicarbonate secretion by the pancreas were studied. Dopaminergic agonists (dopamine, 2, 10, 50, and 250 μg: apomorphine, 1 mg: and noradrenalin, 2, 20, and 200 μg) and inhibitors (haloperidol, 5 mg; pentamethonium, 500 mg; phenoxybenzamine, 15 mg, and atropine sulfate, 10 mg) were tested under basal conditions and under stimulation by a background of secretin (0.1, 0.5, and 10.0 clinical U/hr) or of cerulein (1,200 ng/hr). Low doses of dopamine induced a vasodilation inhibited by haloperidol. Large doses induced a vasoconstriction, presumably by stimulation of α-adrenergic receptors. Dopamine stimulated hydrelatic secretion. The calculated maximal response was about one-half that of secretin. This response was inhibited by haloperidol but not by atropine, pentamethonium, and phenoxybenzamine. No acinar degranulation was observed after stimulation by dopamine. The response to secretin was not altered by haloperidol. It is concluded that blood vessels and pancreatic tissue contain specific receptors to dopamine different from secretin receptors. Secretory response to noradrenalin after phenoxybenzamine was inhibited by haloperidol, suggesting that this effect was mediated by the stimulation of the dopamine receptors of the cells.

4588 THE EFFECTS OF CALCITONIN ON PANCREATIC EXOCRINE SECRETION IN DOGS. (Eng.) Nakashima, Y.; Appert, H. E.; Howard, J. M. (Medical Coll. Ohio at Toledo, Toledo, OH). *Surg. Gynecol. Obstet.* 144(1):71-76; 1977.

The effect of calcitonin on pancreatic secretion was studied in unanesthetized dogs with a Thomas cannula implanted opposite the main pancreatic duct. Pancreatic juice was collected for a 60-min control period, during which time secretion was stimulated by an i.v. infusion of secretin (45 U/hr) and pancreozymin (50 U/hr). Calcitonin (35 μg) decreased the volume, bicarbonate, and enzyme output in the pancreatic juice to about one-half than during the control period. During the 60-min period after calcitonin infusion was stopped, the volume, bicarbonate, and enzyme content of the pancreatic juice increased but remained slightly lower than that of the control period. The infusion of calcium gluceptate, together with secretin and pancreozymin, overcame the inhibitory effect of calcitonin on pancreatic secretion. The results suggest that the mechanism of calcitonin action on pancreatic secretion involves an inhibition of calcium influx into the pancreas.

4589 ACUTE INTERSTITIAL PANCREATITIS IN THE RAT INDUCED BY EXCESSIVE DOSES OF A PANCREATIC SECRETAGOGUE. (Eng.) Lampel, M.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, W. Germany).

Virchows Arch. A Patho. Anat. Histol. 373(2):97-117; 1977.

Conscious male Wistar rats were infused via a jugular vein catheter with 5×10^{-6} g/kg/hr cerulein for periods up to 24 hr to determine if there are any destructive pancreatic changes produced by this decapeptide. On macroscopic inspection, a progressive interstitial edema developed in the pancreas from 1 hr of infusion onward and was most marked at 12 hr. This edema was largely reabsorbed after 24 hr of treatment, but the pancreas was considerably indurated by this time. Serum amylase levels increased consistently to reach a 10-fold elevation above controls after 3, 6, or 12 hr of infusion. Premature fusion of condensing vacuoles and secretory granules led to the formation of large vacuoles in the cytoplasm of exocrine pancreatic cells. These vacuoles fused with the lateral and basal plasma membranes and released their contents into the extracellular space. Regular discharge of zymogen granules at the cell apex into the duct system did not occur. Vacuole formation was associated with cytoplasmic destruction of the pancreatic cells. The rate of protein synthesis decreased consistently as a result of these structural alterations, and this change corresponded largely to a reduction of cellular respiration. Release of amylase from isolated pancreatic lobules of cerulein infused animals showed a progressive increase of unstimulated discharge, while *in vitro* stimulation with 5×10^{-6} M carbamylcholine gave secretion patterns of washout kinetics. Stimulated discharge of labeled secretory proteins indicates a progressive reduction in the *in vitro* sensitivity of the pancreatic cells to secretagogues. After 24 hr of infusions of 5×10^{-6} g/kr/hr cerulein, the pancreatic lobules were totally insensitive to the *in vitro* effect of carbamylcholine or cerulein.

4590 STIMULATION OF PANCREATIC SECRETION OF WATER AND ELECTROLYTES BY FUROSEMIDE.

(Eng.) Thomas, F. B.; Sinar, D.; Caldwell, J. H.; Mekhjian, H. S.; Falko, J. M. (N-937 Univ. Hosp., Ohio State Univ., 410 W. 10th Ave., Columbus, OH 43210). *Gastroenterology* 73(2):221-225; 1977.

To test the hypothesis that diuretics may affect water and electrolyte secretion by the pancreas, the effect of furosemide on secretin-stimulated pancreatic secretion was examined in 12 normal subjects using a perfusion method to quantitate pancreatic output. During continuous secretin infusion (0.9 U/kg/hr), secretory volume rose to a steady-state level of 32.5 ± 10.2 ml/min. When a bolus injection of furosemide (20 mg) was given during continuous secretin infusion, the mean secretory volume increased further to a maximum value of 110 ± 14.7 ml/min. Similarly, the outputs of bicarbonate, sodium, and chloride increased significantly after furosemide (5.8 ± 1.6, 11.0 ± 1.6, and 6.6 ± 0.80 mEq/10 min, resp.), unlike those obtained with secretin infusion alone (2.8 ± 1.0, 4.5 ± 1.4, and 2.1 ± 0.85 mEq/10 min). Total bilirubin output fell after furosemide ($p<0.02$), suggesting that the effect of furosemide on secretory volume and electrolyte output was not due to a stimulatory effect on bile flow. Furosemide also had no effect on duodenal water transport. These observations demonstrate that furosemide stimulates pancreatic secretion of water and electrolytes, possibly via inhibition of pancreatic ductal absorption of sodium.

4591 TROPHIC EFFECTS OF GASTRIN ON THE EXOCRI PANCREAS IN RATS.

(Eng.) Reber, H. A.; Johnson, F.; Deveney, K.; Montgomery, C.; Way, L. (Veterans Admin. Hosp., San Francisco, CA 94121). *J. Surg. Res.* 22(5):554-560; 1977.

The trophic effects of chronic endogenous hypergastrinemia were investigated in the rat pancreas, and the functional significance of these effects on pancreatic secretion was studied. In three groups of hypergastrinemic Sprague-Dawley rats with gastrojejunostomy and gastric antrum transplanted to the colon (AT), pancreatic structure and function were studied 2, 6, or 16 weeks postoperatively. Fasting serum gastrin was 658 ± 88 pg/ml in AT animals compared with 87 ± 12 pg/ml in sham-operated controls. Another group of rats prepared with antrectomy and gastrojejunostomy (A) had low serum gastrin concentrations; they were studied 12 weeks postoperatively. Pancreatic juice was collected after i.v. secretin or cholecystokinin (CCK) and was analyzed for $[HCO_3^-]$, $[Cl^-]$, and total protein. Pancreas histology and DNA/RNA/mg of pancreatic protein were the same in all groups. A twofold increase in $[HCO_3^-]$ and volume of secretion at 2 weeks in AT animals suggested that gastrin exerted a trophic effect on the ducts. By 6 weeks, pancreas weight had increased, probably reflecting acinar growth. By 16 weeks, pancreatic secretion was qualitatively similar to the control group, but the pancreas weights were 35% greater, and absolute secretory capacities were 50% greater. In the A animals, pancreas weights and protein secretion were unchanged, but HCO_3^- secretion was impaired. It i concluded that chronic endogenous hypergastrinemia produced functionally significant hyperplasia of both the duct and acinar cells.

4592 BOVINE PANCREATIC PEPTIDE: ACTION ON GASTRIC AND PANCREATIC SECRETION IN DOGS

(Eng.) Lin, T. M.; Evans, D. C.; Chance, R. E.; Spray, G. F. (Lilly Res. Lab., Eli Lilly and Co., Indianapolis, IN 46206). *Am. J. Physiol.* 232(3): E311-E315; 1977.

The actions of bovine pancreatic peptide (BPP), a recently isolated straight-chain peptide containin 36 amino acid residues, on gastric and pancreatic secretions were evaluated in dogs. In addition, BPP was studied to determine if it has hyperglycem hyperkalemic, and diuretic actions similar to glucagon. BPP (40 μg/kg/hr, i.v.) stimulated gastric acid secretion when given alone, but inhibited the submaximal secretion induced by the C-terminal pentapeptide of gastrin. Basal pancreatic secretion of dogs was inhibited by BPP (1-10 μg/kg/hr), and maximal inhibition was about 80%. In dogs stimulated by secretin alone, BPP (1-50 μg/kg/hr) inhibited pancreatic protein secretion (by peak levels of 50%-75%), but often showed a biphasic action on water-bicarbonate response, an initial augmentation followed by reduction. BPP (205 μg/kg/hr) inhibited the pancreatic water-bicarbonate and protein secretions induced by an infusion of secretin plus cholecystokinin (by 40-67% for protein and by 63-91% for bicarbonate). Des-tyrosyl-NH_2 BPP lacking the C-terminal tyrosyl amide failed to inhibit the gastric acid induced by C-terminal pentapeptide of gastrin or the pancreatic secretion induced by secretin. BPP had no hyper- or hypoglycemic, hyperkalemic, or diuretic actions in the dog.

4593 COMPARISON OF PANCREATIC RESPONSES TO PORTAL AND SYSTEMIC SECRETIN AND VIP IN CATS. (Eng.) Konturek, S. J.; Domschke, S.; Domschke, W.; Wunsch, E.; Demling, L. (Medical Acad. Cracow, Cracow, Poland). *Am. J. Physiol.* 232(2): E156-E158; 1977.

The pancreatic bicarbonate responses to secretin and vasoactive intestinal peptide (VIP) administered by the peripheral or portal route were compared in 24 anesthetized cats. Continuous i.v. infusion of graded doses of secretin (0.04-0.68 nmol/kg/hr), stimulated pancreatic volume flow and bicarbonate outputs dose-dependently and was not statistically different when given by either route. VIP infused in graded doses (0.60 to 9.62 nmol/kg/hr) into the peripheral vein produced pancreatic volume flow and bicarbonate outputs not statistically different from those obtained with secretin. In contrast, the biological activity of VIP administered intraportally was reduced by 60% at lower VIP doses (0.60 and 1.20 nmol/kg/hr) and by 40% at 2.40 nmol/kg/hr, but at higher doses it was not significantly changed. This study provides evidence that VIP in the cat is a secretin like full agonist of pancreatic bicarbonate secretion and that it is only partially inactivated by the liver.

4594 PARASYMPATHETIC CONTROL OF PANCREATIC JUICE SECRETION IN THE RABBIT. (Spa.) Lopez, M. A.; Lupiani, M. J.; Murillo, A. (Departamento Interfacultativo de Fisiologia Animal, Universidad de Granada, Granada, Spain). *Rev. Esp. Fisiol.* 32(1):53-58; 1976.

Pancreatic secretion rate and protein concentration of pancreatic juice were determined in anesthetized rabbits (both sexes, 1.8-3 kg) during electrical or chemical stimulation of the vagal nerves with parasympathomimetics or during i.v. administration of atropine sulfate. A slight increase in flow rate during electrical stimulation (15 V/0.5 msec at 25 pulses/sec) continued for 20 min after stimulation; considerable variation was noted in rates among individual animals, but all animals showed an increase. Protein content of pancreatic juice increased markedly. Very similar increases were produced by infusion or injection of the parasympathomimetics acetylcholine (10 μg/kg/min) and pilocarpine (1 mg/kg). These stimulatory effects may be due to vasodilation. Bradykinin (0.1-4 μg/kg), a vasodilator, caused a considerable increase in pancreatic flow, although protein concentration was reduced. Atropine (1 mg/kg) decreased pancreatic secretion flow rate and protein concentration slightly and, when administered prior to pilocarpine, counteracted the stimulatory effect of the parasympathomimetics. Rabbit pancreatic response to vagal nerve stimulation correlated better with responses in carnivores (dogs and cats) than in herbivores (pigs and horses).

4595 THE EFFECT OF FASTING ON THE IN VITRO SYNTHESIS OF AMYLASE IN RAT EXOCRINE PANCREAS. (Eng.) Vieira-Matos, A. N.; Tenenhouse, A. (Dept. de ciencias fisiologicas, Escuela de Medicina U.D.O., Cd. Bolivar, Venezuela). *Can. J. Physiol. Pharmacol.* 55(1):90-97; 1977.

The effect of fasting upon the *in vitro* synthesis and specific activity of amylase (EC 3.2.1.1.) from rat exocrine pancreas was studied. Female Wistar rats were fasted for 72 hr, while another group was given free access to a balanced commercial diet. The rats were sacrificed and a crude pancreatic extract was prepared. Amylase specific activity and the incorporation of L-(^{3}H)-leucine into amylase were measured using immunological techniques. RNA and protein contents, as well as trypsin and chymotrypsin activities, were also measured and were found to decrease only slightly as a result of fasting; however, amylase activity was decreased about 50%. Using rabbit anti-amylase antibodies, a marked decrease in the amount of immunoprecipitable protein was found. L-(^{3}H)-leucine incorporation into the immunoprecipitable protein decreased by approximately 50%, although no difference in the rate of L-(^{3}H)-leucine incorporation into total pancreatic protein from fed and fasted rats was detected. Pulse-labeling experiments with L-(^{3}H)-leucine showed no significant increase in the rate of amylase breakdown, indicating that the decreased incorporation of radioactivity into the pancreatic amylase of fasted rats was due to a decrease in synthesis of amylase. It is concluded that the rate of amylase synthesis is influenced mainly by food intake rather than by the amount of amylase in the tissue.

4596 ACUTE PANCREATITIS WITH HYPERLIPEMIA: STUDIES WITH AN ISOLATED PERFUSED CANINE PANCREAS. (Eng.) Saharia, P.; Margolis, S.; Zuidema, G. D.; Cameron, J. L. (Johns Hopkins Medical Inst., 601 N. Broadway, Baltimore, MD 21205). *Surgery* 82(1):60-67; 1977.

The proposal that hypertriglyceridemia can initiate acute pancreatitis by pancreatic lipase hydrolysis of triglycerides with the local release of large quantities of free fatty acids (FFA) was investigated. An isolated, *ex vivo*, perfused canine pancreatic preparation was used. Control preparations remained normal in gross appearance, gained little weight (18 g), extracted oxygen and glucose, released carbon dioxide, and continued to secrete during a 4-hr perfusion period. Serum amylase remained normal (972 clinical U/100 ml) as did FFA (1.11 mEq/l). When triglycerides were added to the perfusate to increase the serum triglycerides to 1,600 mg%, the glands became edematous, hemorrhagic, and gained considerable weight (52 g) during the 4-hr perfusion period. Serum amylase became markedly elevated (2,624 clinical U/100 ml), as did the serum FFA (29.19 mEq/l). When FFA were added directly to the perfusate, the glands became edematous, hemorrhagic, and gained weight (90 g), but did so much more rapidly than when triglycerides were added. These studies support the concept that hypertriglyceridemia can initiate pancreatic injury, and they suggest that the mechanism may operate through the release of FFA.

4597 SCIENTIFIC REVIEW NO. 4. TESTS OF EXOCRINE PANCREATIC FUNCTION. (Eng.) Gowenlock, A. H. (Royal Infirmary, Manchester M13 9WL, England). *Ann. Clin. Biochem.* 14(2):61-89; 1977.

4598 FAILURE OF PANCREATIC DUCT LIGATION IN THE RABBIT TO INDUCE PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Arvanitakis, C.; Folscroft, J. (Kansas Univ. Sch. Medicine, Kansas City, KS). *Clin. Res.* 25(3):306A; 1977.

4599 ON THE INVOLVEMENT OF MICROTUBULES AND MICROFILAMENTS IN ENZYME SECRETION OF THE RAT PANCREAS IN VITRO [Abstract]. (Eng.) Stock, C.; Bauduin, H. (U-61 INSERM, Strasbourg, France). *Scand. J. Gastroenterol.* 11(41):62; 1976.

4600 REGULATION OF THE DISSOCIATION OF (^{3}H) CAERULEIN FROM ITS PANCREATIC RECEPTORS: EVIDENCE FOR NEGATIVE COOPERATIVITY [Abstract]. (Eng.) Robberecht, P.; Svoboda, M.; Camus, J. C.; Deschodt-Lanckman, M. (Free Univ. Brussels Medical Sch., Belgium). *Scand. J. Gastroenterol.* 11(41): 69; 1976.

4601 MODIFICATIONS OF PANCREATIC SECRETION INDUCED BY ETHANOL GIVEN DURING A MEAL [Abstract]. (Eng.) Tiscornia, O.; Levesque, D.; Sarles, H. (U-31 INSERM, 46 Chemin de la Gaye, 13009 Marseille, France). *Scand. J. Gastroenterol* 11(41):70; 1976.

4602 THE EFFECT OF CHOLINERGIC STIMULI ON THE PANCREATIC SECRETION OF PROTEIN, AMYLASE AND LIPASE. STUDIES IN PURE HUMAN PANCREATIC JUIC [Abstract]. (Eng.) Ribera, M. T.; Nobre Leitao, C.; Guardia, C.; Puig la Calle, J. (Hosp. Santa Cruz y San Pablo, Barcelona, Spain). *Scand. J. Gastroenterol.* 11(41):57; 1976.

4603 EFFECT OF IONIC STRENGTH ON Ca^{++} FLUXES AND AMYLASE RELEASE IN ISOLATED PANCREAT CELLS [Abstract]. (Eng.) Shulz, I.; Kondo, S. (Max Planck Inst. fur Biophysik, Kennedyallee 70, 6 Frankfurt, W. Germany). *Scand. J. Gastroentero* 11(41):61; 1976.

4604 DIAZOXIDE INHIBITION OF PANCREATIC EXOCR SECRETION STIMULATED BY SECRETIN [Abstra (Eng.) Pedrazzoli, S.; Dodi, G.; Militello, C.; Favretti, F.; Brandstetter, S.; Lise, M. (Clinica Chirurgica, Universita' di Padova, Via Giustiniani n. 3, Italy). *Eur. Surg. Res.* 8(Suppl. 2):49-50; 1976.

4605 LONG TERM INFLUENCE OF LIGATURE OF THE PANCREATIC DUCT UPON THE APPARENT DIGEST IBILITY OF A DIET, IN THE PIG [Abstract]. (Eng.) Corring, T.; Bourdon, D. (INRA, 78350 Jouy en Josa France). *Scand. J. Gastroenterol.* 11(41):48; 1976

See also, 4491, 4492, 4509, 4713, 4997, 4999, 5000

SECRETION AND METABOLISM

Hepatobiliary Tract

4606 IMPROVED ISOLATED LIVER CELL PREPARATION: MONITORING HYDROSTATIC PRESSURE AND RETURN FLOW DURING LIVER PERFUSION. (Eng.) Wittman, J. S., III; Jacobus, K. E. (Roche Res. Center, Hoffmann-LaRoche Inc., Nutley, NJ 07110). *Anal. Biochem.* 79(1/2):58-62; 1977.

The addition of a hydrostatic pressure gauge and a return-flow meter to a perfusion apparatus for the preparation of improved isolated liver cell preparations is described. A hydrostatic pressure gaug is made by attaching transparent vinyl tubing to a meter stick, with the upper end open to atmospheri pressure and the lower end connected to the bubble trap. A flow meter is installed in the return lin between the liver and the perfusate reservoir. Th use of these two gauges can assure that the cannulae are properly placed and that the perfusate is flowing. In addition, they provide data that demonstrate whether digestion is sufficient, and they indicate a blockage. The liver is protected from excessive swelling by allowing the perfusate to fill the pressure gauge while the blockage is being cleared. This apparatus was used to prepare isolated hepatocytes from female Charles River CD rats by perfusion of livers with collagenase-hyaluronidase. The length of time required for digestion varied with different batches of collagenase and ranged from 17 to 33 min. A particular batch was reproducible within about ±10% between livers. Increasing the collagenase concentration decreased the time required for digestion. Perfusion of the livers without hyaluronidase or with Swim's media or 100% oxygen did not affect yield or percentage of viability. However, if the perfusion was terminated before the liver began to lose its structure, increased mechanical manipulation was required to free individual cells, resulting in a decrease in cell yield and percentage of viable cells. Hydrostatic pressure remained fairly constant during the enzymatic digestion. Return-flow rate invariably fell during the perfusion.

4607 CELL KINETICS IN THE LIVER OF RATS UNDER NORMAL AND ABNORMAL DIETARY CONDITIONS: AN AUTORADIOGRAPHIC STUDY BY MEANS OF [^{3}H] THYMIDINE.

(Eng.) Blikkendaal-Lieftinck, L. F.; Kooij, M.; Kramer, M. F.; Den Otter, W. (Dept. Pathology, State Univ., Pasteurstraat 2, Utrecht, Netherlands). *Exp. Mol. Pathol.* 26(2):184-192; 1977.

DNA synthesis in the liver acinus of 4- to 5-week-old male Wistar WU rats fed either a normal diet or a bacon diet was studied autoradiographically by ^{3}H-thymidine labeling. In rats fed a normal diet (21.1% protein, 5.0% fat, 51.9% carbohydrate, 11.5% water, 6.3% ash, and 4.2% fiber), the DNA synthetic index was 4.3% on the first day after ^{3}H-thymidine injection and decreased gradually over a 150-day period to a value of about 1.5%. At 3 hr after the injection of ^{3}H-thymidine, most of the labeled nuclei were seen in zone I of Rappaport's simple liver acinus, and as time proceeded, there was a shift of the peak value of labeled nuclei in the direction of the terminal hepatic venule (THV) over the 150-day observation period. When rats were fed a bacon diet (3.5 ± 1.4% protein, 86.1 ± 6% fat, 12.1 ± 4.3% water, and 0.12 ± 0.09% ash) for 30 days, the DNA synthetic index was only 0.2%, and it remained at this level up to 150 days after injection. The cumulative frequency of the labeled nuclei along the hepatic plate showed that, in this experiment also, labeled nuclei moved to the THV. When the rats maintained on the 30-day bacon diet were given a normal standard diet, the DNA synthetic index increased after the 1st day on the normal diet and reached a peak of greater than 5% after about 2 days. The peak value of DNA synthesizing nuclei was in zone II after 2 days of a normal diet. After 1 week, the peak value moved to zone I. It thus appears that DNA synthesis in the rat liver can be depressed by a 30-day bacon diet and that the synthesis can be restored by a normal standard diet within 2-3 days.

4608 RESEARCH ON INTERAZYGOPORTAL DISCONNECTION THROUGH VOSSCHULTE'S RING. EXPERIMENTAL STUDY IN THE DOG.

(Fre.) Germain, M.; Martin, E. (3, rue de l'Harmonie, 75015 Paris, France). *J. Chir. (Paris)* 111(3):377-388; 1976.

Twenty-nine dogs with esophageal varices due to portal hypertension underwent interazygoportal disconnection with endoprothesis using Vosschulte's rings (VR). The rings had an outer diameter of 12 or 16 mm. Animals were anesthetized with penthotal (2 cg/kg), and intubated with oxygen prior to the procedure. Eight dogs served as controls and received portal vein ligature to induce portal hypertension 3 weeks prior to the experiment. Esophageal varices did not develop in six of the controls; the remaining animals died (1 of barbiturate coma and 1 of esophageal perforation). Nine of the 20 dogs that received a 12-mm VR either had to be sacrificed or died within 1 month of surgery. Eight of the nine dogs given a 16-mm VR survived for 4-5 months. Morbidity in the dogs receiving a VR was marked; of the 19 surviving animals, 18 presented with diarrhea and regurgitation. Esophagogastric transit produced an immediate subcardiac stenosis in 18 animals, sometimes with dilatation of the substructural esophagus. Macroscopic examination of esophagogastric specimens showed a subcardiac indurated ring. Histology revealed normal esophageal structure. In the stricture zone, no subserous or submucosal arteries and veins of large diameter were noted. In treating esophageal varices with interazygoportal disconnection, optimal results were obtained with VR rings of the same diameter as the esophagus. Morbidity due to regurgitation may be reduced by early instrumental dilatation.

4609 MICROCIRCULATION STUDIES OF EXPERIMENTAL LIVER REGENERATION.

(Fre.) Bourgeon, R.; Isman, H.; Brisard, M.; Letourneau, J. (Clinique chirurgicale, Hopital Saint-Roch, 5, rue P.-Devoluy, 06000 Nice, France). *Rev. Fr. Gastroenterol.* (125): 45-47; 1977.

Microcirculation studies of experimental liver regeneration (LR) were performed in 45 Fauve de Bourgogne rabbits that had been subjected to ablation of the caudal and lateral left liver lobes. Groups of five rabbits were sacrificed weekly. Immediately before sacrifice, the hepatic artery, portal vein, and biliary ducts were catheterized *in vivo*, and China ink was injected into the hepatic artery, carmine/gelatin was injected into the portal vein, and the biliary ducts were filled with trypan blue gelatin. Ectasia of the biliary ducts and intense dilation of the parietal arterial plexus marked the beginning of LR. Hepatocyte multiplication occurred by stages as arterial penetration crossed the different zones of the lobules. The terminal stage was marked by the arrival of arterial blood in the centrolobular veins, sometimes by the porto-subhepatic arterial shunts. Supplementary subhepatic veins appeared in lobules that became very large due to hepatocyte proliferation. New spaces partitioned the large lobules into smaller ones in an organized fashion, which marked the end of LR. In conclusion, LR is essentially hepatocytic and it proceeds (for the biliary ducts and vessels) by initial ectasia of the lumen.

4610 DIURNAL BIOLOGICAL RHYTHMS OF THE GRANULATION TISSUE CELLS IN A WOUND OF THE LIVER.

(Rus.) Arend, Yu. E.; Torpats, T. Yu. (Medical Faculty Tartu, Univ. Tartu, USSR). *Arkh. Anat.* (10):58-61; 1976.

The diurnal biological rhythms of granulation tissue cells (fibroblasts) were studied in a wound of the liver of 37 young mature male Wistar rats (first series) and 44 young mature female Wistar rats (second series), 4 and 9 days, resp., after the injury. The first series of animals, injected with ^{3}H-methionine, were killed in groups of 6-7 every 4 hr during one day, and the second series, injected with ^{35}S-sulfate in groups of 3-4 rats, during two days. Diurnal changes in the number of mitotically dividing and DNA-synthesizing fibroblasts were found in the first series of rats. Maximum mitosis was observed in the period from the mid-day to 4 p.m., decreasing to a minimum at 8 p.m., and the second peak of mitoses appeared from midnight to 4 a.m. with the further decrease at 8 a.m. The maximum intensive synthesis of DNA took place at 8 a.m., i.e., 4 hr before the first peak of mitoses. In the second rat series (9 days after injury), the same diurnal rhythm of mitoses in the first day was found; in the second day the second peak of mitoses was absent. Synthesis of proteins and sulphated mucopolysaccharides in fibroblasts was maximum at 4 p.m. There appears to be a definite rhythm in mitotic activity of the granulation tissue cells and in the synthesis of DNA and sulphated mucopolysaccharides in the rat liver wounds. The degree of coordination requires further study.

4611 DRUG METABOLISM IN ADULT RAT HEPATOCYTES IN PRIMARY MONOLAYER CULTURE. (Eng.)

Guzelian, P. S.; Bissell, D. M.; Meyer, U. A. (Medical Coll. Virginia, Box 217, MCV Station, Richmond, VA 23298). *Gastroenterology* 72(6):1232-1239; 1977.

Cytochrome P-450 and microsomal oxidase activities were examined in adult rat hepatocytes during the first 48 hr after the initiation of monolayer culture. In the 24- to 48-hr period immediately following preparation and culture of the isolated parenchymal cells, the level of cytochrome P-450, measured in extracts of cell homogenates, declined to less than 20% of its *in vivo* level, whereas NADPH-cytochrome *c* reductase activity was only moderately reduced and glucose-6-phosphatase activity remained unchanged. The activity of aminopyrine-*N*-demethylase and aniline hydroxylase also fell, paralleling the level of cytochrome P-450. By contrast, *p*-nitroanisole *O*-demethylase activity was unchanged in the cultured hepatocytes despite evidence (type I binding spectrum, NADPH requirement, inhibition by carbon monoxide or by SKF 525A [a competitive inhibitor of cytochrome P-450-mediated drug metabolism]) that *p*-nitroanisole *O*-demethylas is a cytochrome P-450-dependent enzyme. In cultur as *in vivo*, aromatic polycyclic hydrocarbons stimulated *p*-nitroanisole *O*-demethylase and aryl hydrocarbon (benzo[*a*]pyrene) hydroxylase activities; however, this effect was not accompanied by a detectable increase in total carbon monoxide-binding hemoprotein. The data indicate that the profile o microsomal oxidase enzymes and their control undergo striking changes as hepatocytes adapt to cell culture.

4612 PHYSIOLOGY OF BILIARY EXCRETION OF ROENTGENOGRAPHIC CONTRAST MEDIA. (Ger.) Fucl

W. A. (Institut fur Diagnostiche Radiologie, Inselspital, CH-3010 Bern, Switzerland). *Radiologe* 17 (2):64-69; 1977.

Studies of the transport, resorption, uptake, and excretion of contrast agents used for p.o. (Na iopanoate, Na tri-iopanoate, Na, Ca opodate, Na ioben amate, Na bunamiodyl, and Na tyropanoate) and i.v. cholecystocholangiography (water-soluble iodipamid ioglycamide, iotroxamide, and iodoxamide) are reviewed. Passive diffusion through the intestinal mucosa is believed to be responsible for the intestinal resorption of p.o. contrast agents; bile aci increase the solubility of these agents. Selectiv uptake is due to membrane transport and binding to ligandins (Y and Z protein) in the hepatocyte cytoplasm. P.o. contrast agents are conjugated in the liver to water-soluble glucuronic acid conjugates, which facilitates their transport through the canalicular hepatocyte membrane. Canalicular excretion is due to an active anionic transport system, which has a transport maximum. The biliary excretion of iopanoate and the radiological visualizati of the gallbladder are improved by activation of the enterohepatic circulation of bile acids. The biliary excretion of i.v. contrast agents is associated with intense choleresis. Most of the p.o. contrast agent reaches the gallbladder, where it becomes concentrated due to water resorption throu the gallbladder mucosa.

4613 INTERACTION OF BROMOSULFOPHTHALEIN WITH MITOCHONDRIAL MEMBRANES--UPTAKE OF BROMOSULFOPHTHALEIN AND EFFECT ON ANS-FLUORESCENCE.

(Eng.) Burr, R.; Schwenk, M.; Pfaff, E. (Inst. Toxicology, Univ. Tubingen, D-7400 Tubingen, W. Germany). *Biochem. Pharmacol.* 26(6):457-460; 1977.

The interaction of BSP with mitochondrial membranes and the effect of BSP on 8-anilinonapthalene 1-sulfonic acid (ANS)-fluorescence was studied in Spragu Dawley rat livers. When BSP was added to a mitochondrial suspension, its free concentration was rapidly decreased by uptake. The time course was very fast (complete within 20 sec) and could not be resolved by the centrifugal filtration technique Scatchard plots of a series of uptake experiments at constant mitochondrial concentrations showed a concave curvature, indicating that the affinity continuously decreases. The decrease in binding affinity is ascribed to an increased negative surface charge resulting from insertion of the negatively charged BSP molecule into the hydrophilic-hydrophobic interphase of the membrane and rendering further binding of anionic molecules more difficult. The binding capacity of mitochondria was found to be as high as, or greater than, 150 nmol/mg protein. Even at these high concentrations, binding was reversible, and the inner membranes of mitochondria were not disrupted, since mitochondria were still centrifugable. BSP uptake depended upon the energetic state of the mitochondria; in the de-energized state, a little more of the dye was taken up than in the energized state. When BSP was added to a mitochondrial suspension containing ANS, the ANS-fluorescence decreased. Above 5 nmol/mg protein, there was a logarithmic decrease with increasing BSP concentrations. The fluorescent dye was released from the mitochondria to the same extent as fluorescence decreased.

4614 HEPATOTOXICITY OF CHENODEOXYCHOLIC ACID: A HISTOPATHOLOGICAL AND ULTRASTRUCTURAL STUDY IN RABBITS.

(Por.) Grimaldi Filho, G. (Departamento de Patologia de UFBa, Anexo I da Faculdade de Medicina, Rua Padre Feijo, 31, 40000 Salvador BA, Brazil). *Arq. Gastroenterol.* 14(2):76-82; 1977.

Chenodeoxycholic acid (50 mg/150 g diet/day) was fed to groups of eight female rabbits for 30 or 60 days; controls received a standard diet. Light microscopy of the liver tissue revealed in the 60-day group severe proliferation of the biliary canals, biliary and parenchymal lesions, portal fibrosis, and one case of cholestasis. The 30-day hepatotoxic effects were similar but more moderate, except for severe portal fibrosis and inflammatory infiltration. Electron microscopy of liver tissue from the 60-day group showed extensive damage to the biliary canaliculi, the presence of autophagocytic vesicles, intrahepatic cholestasis, and an excess of intrahepatic triglycerides and biliary pigments. The 30-day group showed severe hyperplasia of the smooth endoplasmic reticulum. The primary effects of chenodeoxycholic acid in the liver are ultrastructural modification and deactivation of the reticuloendothelial enzyme systems, which lead to intrahepatic cholestasis and the other observed effects.

4615 HEPATIC STORAGE AND BILIARY TRANSPORT MAXIMUM OF TAUROCHOLATE AND TAUROCHENODEOXYCHOLATE IN THE DOG.

(Eng.) Poupon, R.; Poupon, R.; Dumont, M.; Erlinger, S. (Hopital Beaujon, F 92110 Clichy, France). *Eur. J. Clin. Invest.* 6(6):431-437; 1976.

Experiments were performed on anesthetized dogs after depletion of the endogenous bile acid pool to validate the multiple infusion method previously used for the study of hepatic BSP transport and to obtain estimates of the relative storage capacities and secretory transport maxima for taurocholate (TC) and taurochenodeoxycholate (TCDC). Bile was collected continuously to prevent recirculation of bile acids and to measure their secretion rates. TC and TCDC were infused i.v. into dogs at three different rates, and serum bile acid concentrations were determined at intervals of 10 min. In the last 30 min of each infusion period, serum bile acid concentration changed linearly with respect to time, with linear correlation coefficients ranging from 0.95 to 0.99. The mean hepatic relative storage capacities for TC and TCDC were 0.16 ± 0.07 μmol and 0.09 ± 0.03 μmol (μmol/l/kg body weight), resp. The mean secretory transport maximum (in μmol/min/kg body weight) of TC was 4.84 ± 1.24 when calculated and 4.50 ± 0.81 when measured, and of TCDC was 3.56 ± 0.06 by calculation and 3.29 ± 0.09 by measurement. The value of the secretory transport maximum was slightly higher and the relative storage capacity was lower with the multiple infusion method as compared with direct measurement of biliary secretion. The biliary secretion of bile acids achieved a maximal rate 20 min after the start of infusion and was independent of the serum bile acid concentration. The procedure is not applicable to man because of potential toxicity due to the high concentration (220-1,000 μmol/l) of serum bile acid employed.

4616 EVIDENCE FOR CARRIER PROTEINS IN BILE ACID SYNTHESIS. THE EFFECT OF SQUALENE AND STEROL CARRIER PROTEIN AND ALBUMIN ON THE ACTIVITY OF 12α-HYDROXYLASE.

(Eng.) Grabowski, G. A.; McCoy, K. E.; Williams, G. C.; Dempsey, M. E.; Hanson, R. F. (Gastroenterology Unit, Univ. Minnesota, Minneapolis, MN 55455). *Biochim. Biophys. Acta* 441(3):380-390; 1976.

The possibility that carrier proteins are involved in bile acid synthesis was investigated using rat liver homogenates. The 105,000 x *g* supernatant fraction contained heat-stable proteins that bound the bile acid precursor, 7α-hydroxy-4-cholesten-3-one and increased the amount of 7α,12α-dihydroxy-4-cholesten-3-one formed by the microsomal enzyme, 12α-hydroxylase. Subsequent studies were carried out to determine if squalene and sterol carrier protein or albumin, two lipid-binding proteins present in the 105,000 x *g* supernatant fraction of rat liver homogenates, are responsible for the effects seen with this fraction. Squalene and sterol carrier protein bound several water insoluble bile acid precursors, including 7α-hydroxy-4-cholesten-3-one, and increased the apparent activity of 12α-hydroxylase. Squalene and sterol carrier protein, however, did not bind either cholic acid or chenodeoxycholic acid. Rat serum albumin also bound 7α-hydroxy-4-cholesten-3-one and increased the apparent activity of 12α-hydroxylase. Kinetic analysis indicated that the apparent stimulation of 12α-hydroxylase by squalene and sterol carrier protein and albumin was due to increased solubilization of the substrate, 7α-hydroxy-4-cholesten-3-one. These studies indicate that bile-acid precursor carrier proteins are present in the 105,000 x *g* supernatant fraction of rat liver homogenates and suggest that squalene and sterol carrier protein or albumin may participate as carrier proteins in bile acid synthesis.

4617 IN VITRO EFFECT OF FREE BILE ACIDS ON THE BILE CANALICULAR MEMBRANE PHOSPHOLIPIDS IN THE RAT. (Eng.)

Yousef, I. M.; Fisher, M. M. (Dept. Pathology, Univ. Toronto, Ontario, Canada M5S 1A8). *Can. J. Biochem.* 54(12):1040-1046; 1976.

The effect of free bile acids on bile canalicular membrane phospholipid solubilization was studied to understand the origin of biliary lipids. Plasma membranes (PM) and bile canalicular membranes (BCM) were fractionated from liver cell plasma membranes, and their aliquots were incubated with cholic (CA), deoxycholic (DOCA), and chenodeoxycholic (CDCA) acids at bile acid/membrane phospholipid mole ratios of up to 100. Phospholipid (PL) solubilization from the plasma membranes and microsomes was linear and nonselective while that from BCM was biphasic and selective. About 60% of the total PL of microsomes, 30% of the PL of the PM, and 20% of the PL of the BCM were solubilized at a CA/PL mole ratio of 100 ($p<0.001$). Complete solubilization of the microsomal and PM lipids, at a bile acid (DOCA and CDCA)/PL mole ratio of 20 and 40, resp.; the slope of the solubility curve for the segments of the curve for 0-50% and 50-100% solubilization were similar. However, for the BCM, the slope of the curve (using DOCA or CDCA) representing 0-50% solubilization was six times greater than that of the curve representing 50-100% solubilization. Phosphatidyl choline and phosphatidyl ethanolamine made up 90% of the PL solubilized from the BCM at a bile acid (DOCA or CDCA)/membrane PL mole ratio sufficient to solubilize 50% of the total PL. These initial PL (molecular species and fatty acid components) solubilized from the BCM are similar to those of bile of the same animal but are unlike those solubilized at higher bile acid/PL mole ratios. On the basis of previous and present work the origin of the bile lipids in the BCM is suggested.

4618 ACTION OF THREE BILE ACIDS ON HEPATIC AND INTESTINAL CHOLESTEROGENESIS IN THE RAT. (Eng.)

Reynier, M. O.; Marteau, C.; Vigne, J. L.; Mule, A.; Crotte, C.; Gerolami, A. (Institut National de la Sante et de la Recherche Medicale INSERM U 31, 46, chemin de la Gaye, 13009 Marseille, France). *Lipids* 12(3):254-257; 1977.

The inhibitory actions of sodium taurocholate, sodium taurochenodeoxycholate, and sodium taurodehydrocholate on cholesterol synthesis were compared in male Wistar rats during acute interruption of bile enterohepatic circulation. Acetate incorporation into cholesterol in the livers of rats infused with sodium taurocholate (7.5 μmol/100 g/hr) and killed at noon was the same as in controls; cholesterol synthesis was also similar in control and experimental rats treated with taurocholate and killed at midnight. Similarly, sodium taurodehydrocholate (20 μmol/100 g/hr) was without effect. In the liver, taurochenodeoxycholate (7.5 μmol/100 g/hr) prevented the increase in cholesterol synthesis induced by biliary drainage. The jejunal cholesterol synthesis was reduced by taurocholate and taurochenodeoxycholate but was not modified by taurodehydrocholate infusion. The results show that the effects of bile acids on cholesterol synthesis are related to their structures. Since taurodehydrocholate, which does not form micelles at the concentrations used, did not have any effect on cholesterol synthesis, the inhibitory action of bile salts on intestinal cholesterogenesis may depend on their detergent properties.

4619 EFFECT OF FAT INTAKE ON CHOLESTEROL TURNOVER AND BILE ACID FORMATION. (Eng.)

Iritani, N.; Fukuda, E.; Ibamoto, K. (Tezukayama Gakuin Coll., Sumiyoshi-ku, Osaka 558, Japan). *J. Nutr. Sci. Vitaminol. (Tokyo)* 23(1):35-42; 1977.

The effects of varied amounts of dietary fat on overall cholesterol metabolism were investigated in male Wistar rats fed one of three sucrose diets: one fat-free, one containing 3% fat, and one containing 10% fat. The fat in these diets had a balanced composition of fatty acids. After 1 week on one of the diets, the rats received 5 μCi $^3H(G)^2$-cholesterol, i.p. The excretion of neutral sterols, bile acids, and radioactivity was determined in feces collected for 1- to 7-day periods after injection. The coprostanol excretion was similar in all groups, and the bile acid excretion increased with increasing fat intake; however, the excretion of (^3H)-cholesterol in the 3% fat group (35.6 mg/28 days) was greater than that in the fat-free group (33.9 mg/28 days); cholesterol excretion in the 10% fat group was less than that in the fat-free group (27.4 mg/28 days). Consequently, the sp cific radioactivity of bile acids was lower in the group (6.2 counts/min [cpm] x 10^3/mg) than in the 3 group (11.2 cpm x 10^3/mg) and in the fat-free group (11.8 cpm x 10^3/mg). The half-life of labeled cholesterol was 12.6, 16.0, and 22.2 days for the 3%, 10% fat, and fat-free groups, resp. A low-fat diet of about 3% fat is more useful in eliminating cholesterol by increasing the formation of bile acids to emulsify fat than is a fat-free diet. In the 10% fat group, however, the enlarged pool size of bile acid probably delayed cholesterol metabolis to bile acids.

4620 ULTRASTRUCTURE OF GALLSTONES PRODUCED IN MICE FED A HIGH CHOLESTEROL DIET. (Eng.)

Saland, L. C.; Napolitano, L. M. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *Anat. Rec.* 187(2):207-218; 1977.

The gallstones induced in female mice by a high cholesterol-cholic acid diet were examined by transmission electron microscopy after glutaraldehyde-digitonin fixation. Electron micrographs of gallbladder contents from animals fed the diet for 2 months revealed layered structures and considerable amorphous material. Some areas exhibited smal rounded substructures that appeared to be isolated from larger layered areas. Close examination of larger layered structures within fixed pellets revealed areas of needle-like spicules or whorls in their centers. Gallbladder contents of mice kept on the high cholesterol diet for 5-6 months contained ultrastructural features similar to those observed in animals sacrificed earlier. In addition, occasional rectangular, hexagonal, or parallelogram-shaped objects, suggesting crystals, were observed. The results suggest that the layered appearance of gallstones arises by cohesion of material rich in cholesterol to form more ordered structures.

4621 BILIARY SECRETION OF COPPER IN HEALTHY MAN. QUANTITATION BY AN INTESTINAL PERFUSION TECHNIQUE. (Eng.) van Berge Henegouwen, G. P.; Tangedahl, T. N.; Hofmann, A. F.; Northfield, T. C.; LaRusso, N. F.; McCall, J. T. (Nijmegen Univ. Sch., St. Radboud Hosp., Nijmegen, Netherlands). *Gastroenterology* 72(6):1228-1231; 1977.

The 24-hr biliary copper output was determined in 14 subjects with normal hepatic and gallbladder function, using a duodenal perfusion technique that permitted a normal daytime eating pattern of three liquid meals and an overnight fast. Daily biliary output was also determined by direct measurement on four 24-hr bile collections from three patients with complete biliary diversion; in four patients dietary copper intake and fecal copper output were also determined. A mean bile copper output of 25 ± 13 μg/kg/day (1.7 ± 0.8 mg) was obtained in 19 perfusion studies in the 14 subjects; the range was 9.0-53.0 μg/kg/day. The values in the 24-hr bile collections were similar to those obtained using the perfusion method. Biliary copper output was similar during the day and night, and there was no correlation between hourly rates of copper output and hourly rates of bile acid output, nor was there any correlation between daily copper output and daily bile acid output. The similar values for dietary intake, biliary output, and fecal output provide additional support for the view that in healthy man, copper balance is maintained by biliary secretion and subsequent fecal excretion of copper that has been absorbed in the stomach and proximal duodenum

4622 STIMULATION OF HEPATIC PHOSPHATIDATE PHOSPHOHYDROLASE ACTIVITY BY A SINGLE DOSE OF ETHANOL. (Eng.) Savolainen, M. J. (Dept. Medical Biochemistry, Univ. Oulu, Kajaanintie 52 A, SF-90220 Oulu 22, Finland). *Biochem. Biophys. Res. Commun.* 75(2):511-518; 1977.

An acute ethanol load (5 g/kg) given by gastric intubation to fasted male Long-Evans rats caused a significant increase in phosphatidate phosphohydrolase activity in the soluble fraction of the liver, with the activity being increased twofold at 8 hr and threefold at 16 hr after ethanol administration, in comparison with controls. At 24 hr (about 2 hr after the disappearance of ethanol from the blood), the enzyme activity was still 50% higher than in controls ($p<0.0025$); at 36 hr, there was no difference between ethanol-treated and control enzyme activity. The increase in phosphatidate phosphohydrolase activity in ethanol-treated rats was followed by an accumulation of neutral glycerolipids in the liver, with the hepatic triacylglycerol level at 24 hr after ethanol administration being greater than 15 μmol/g wet weight, as compared to less than 5 μmol/g before ethanol treatment. Assays of cytoplasmic phosphatidate phosphohydrolase activity, using ^{14}C-labeled microsome-bound phosphatidic acid as substrate, showed the activity at 16 hr after ethanol administration to be increased from a control level of 1.71 ± 0.35 to 5.28 ± 0.16 nmol of diacylglycerol formed/sec/g wet weight of liver ($p<0.001$). When 0.1 mCi of (1,3-^{3}H)-glycerol was injected into the portal vein of rats at 0.5 or 16 hr after ethanol administration (5 g/kg), the pattern of labeled glycerol was found to be significantly different from that of control rats at 16 hr. The pattern of radioactivity incorporation into intermediates of hepatic glycerolipid synthesis showed an ethanol-induced cross-over point between phosphatidic acid and diacylglycerol, i.e., in the step catalyzed by phosphatidate phosphohydrolase. This cross-over was observed only when the phosphatidate phosphohydrolase activity was increased.

4623 EFFECT OF CHRONIC ETHANOL ADMINISTRATION ON LIVER ALCOHOL DEHYDROGENASE ACTIVITY IN MICE. (Eng.) Dippel, C.; Ferguson, J. H. (Dept. Biological Sciences, Univ. Idaho, Moscow, ID 83843). *Biochem. Pharmacol.* 26(5):441-442; 1977.

The induction effect of chronic ethanol consumption on alcohol dehydrogenase activity was studied in male Swiss-Webster mice that consumed 15% ethanol in the drinking water from their 21st to 73rd or 74th day of life. Ethanol drinking produced a 20% increase in hepatic alcohol dehydrogenase activity over that in controls ($p=0.015$). The results support the concept that alcohol dehydrogenase activity is altered in response to chronic ethanol exposure at moderate doses.

4624 EFFECT OF ACUTE ETHANOL INTOXICATION ON THE NEURAMINIDASE ACTIVITY OF RAT LIVER GOLGI APPARATUS. (Eng.) Kishore, G. S.; Carubelli, R. (Univ. Oklahoma Health Sci. Center, Oklahoma City, OK 73104). *Biochim. Biophys. Acta* 497(G64): 101-111; 1977.

Neuraminidase and galactosyltransferase were investigated in the Golgi (Gt) apparatus and in the three fractions of increasing density (GF$_1$, GF$_2$, and GF$_3$) isolated from the microsomal fraction of rat liver homogenates by flotation in a discontinuous sucrose density gradient. Fifty percent decreases in neuraminidase content (U/g liver) and specific activity (U/mg protein) were observed in the Golgi as well as in the three fractions isolated at 45 min, 90 min, 180 min, and 16 hr after administration of a single p.o. dose of 50% aqueous ethanol (0.6 g/100 g). Colchicine administration (0.5 mg/100 g, i.p.) caused a similar loss of neuraminidase activity; however, the effect of ethanol plus colchicine was not additive. Golgi galactosyltransferase activity increased following ethanol administration, but, unlike previously reported results, significant increases in total activity and specific activity were already evident 90 min after ethanol ingestion (69.46 ± 10.22, 3.48 ± 1.12, 16.93 ± 1.93, and 41.15 ± 5.33 U/g in control fractions of Gt, GF_1, GF_2, and GF_3, resp., increased to 108.19 ± 1.21 U/g [$p<0.01$], 16.80 ± 3.58 U/g [$p<0.025$], 30.65 ± 4.03 U/g [$p<0.025$], and 61.32 ± 5.73 U/g [$p<0.05$], resp.). In contrast with the decreased values observed in Golgi, the total particle-bound neuraminidase was significantly elevated following ethanol administration. Ultrastructural studies revealed increased lysosomal content and detachment of polysomes from the rough endoplasmic reticulum. The low levels of Golgi neuraminidase probably reflect an accelerated and preferential segregation of acid hydrolases from Golgi apparatus into the lysosomal compartment. This enhanced production of lysosomes appears to be required for the increased autophagic processes needed to dispose of altered subcellular organelles in the ethanol-damaged cells.

4625 EFFECT OF ETHANOL ADMINISTRATION ON THE ACTIVITY OF HEPATIC LYSOSOMAL ENZYMES.

(Eng.) Mezey, E.; Potter, J. J.; Ammon, R. A. (Baltimore City Hosp., Baltimore, MD). *Biochem. Pharmacol.* 25(23):2663-2667; 1976.

The effect of acute, short-term, and prolonged chronic administration of ethanol on the total and free activity of hepatic lysosomal enzymes was investigated in male rats. The acute administration of ethanol (4 g/kg, p.o. b.i.d.) as a 40% solution and the chronic administration of ethanol as 36% of the calories in the diet for 1 month did not result in any changes in lysosomal enzymes. Ethanol feeding for 6 months resulted in increases in the total activities of several enzymes as compared with controls: β-glucuronidase (0.76 ± 0.036 versus 1.14 ± 0.164 μmol/g liver/min, $p<0.05$), β-*N*-acetylglucosaminidase (3.69 ± 0.323 versus 5.30 ± 0.537 μmol/g liver/min, $p<0.05$), and arylsulfatase A (3.52 ± 0.124 versus 4.64 ± 0.316 μmol/g/min, $p<0.01$), measured in the homogenates. Increases in the specific activities of these enzymes plus acid phosphatase measured in the lysosomal fraction were also noted (31.5 ± 1.75, 599.9 ± 52.50, 287.8 ± 54.49, and 536.4 ± 41.61 nmol/mg protein/min, resp., in controls versus 51.2 ± 6.68, 1,200.5 ± 244.40, 540.0 ± 107.8, and 812.0 ± 65.3 nmol/mg protein/min, resp., in animals fed ethanol for 6 months). In addition, there were increases in the free activities of β-glucuronidase and acid phosphatase measured in the homogenates. Hyaluronidase was not changed by ethanol feeding. The increases in lysosomal enzymes were accompanied by histologic changes consisting only of mild fatty infiltration. The increases in total and free lysosomal enzymes may explain the increased activity of lysosomal enzymes found in the serum of chronic alcoholic patients.

4626 METABOLISM OF ETHANOL AND SORBITOL IN CLOFIBRATE-TREATED RATS.

(Eng.) Poso, A. R.; Hillbom, M. E. (Coll. Veterinary Medicine, Hameentie 56, SF-00550 Helsinki 55, Finland). *Biochem. Pharmacol.* 26(4):331-335; 1977.

The rates of ethanol and sorbitol removal and the cytoplasmic and mitochondrial redox states of the liver were determined in female Sprague-Dawley rat pretreated with clofibrate (ethyl-α-*p*-chlorophenox isobutyrate, 0.2 g/kg, s.c.) for 2-15 days. The rats received 2 M ethanol (10 mmol/kg/, i.v.) with or without sorbital (10 mmol/kg). Clofibrate administration for 2 days significantly increased the liver ethanol elimination ($p<0.05$), but this effect disappeared when clofibrate treatment was continued. A significant increase in liver mass took place within a week ($p<0.001$), but this cann explain the initial increase in ethanol removal. The rate of sorbitol removal was significantly decreased by clofibrate ($p<0.01$), and a decrease in liver sorbitol dehydrogenase activity ($p<0.05$) was also observed. The sum of ethanol removal and sorbitol removal, when they were simultaneous metabolized, was significantly decreased in clofibrate-treated rats as compared with controls. Sorbitol inhibition of ethanol elimination was increased (from 25% to 31-47%) but ethanol inhibition of sorbitol elimination was abolished by clofibrate administration. Ethanol and sorbitol cau similar changes in cytoplasmic (lactate/pyruvate) and mitochondrial (β-OH-butyrate/acetoacetate) redox states of clofibrate-treated rat liver, as has been previously observed in livers of control animals.

4627 ABSORPTION, DISTRIBUTION AND EXCRETION A DIHYDROXYDIBUTYL ETHER LABELLED WITH ^{14}C IN ANIMALS.

(Eng.) Porta, R.; Fregnan, G. B (Istituto Luso Farmaco d'Italia, s.r.l., Via Carn 26, I-20 132 Milan, Italy). *Arzneim. Forsch.* 27(118-122; 1977.

The absorption, distribution, and elimination of ^{14}C-labeled dihydroxy-dibutyl ether (DHBE) was studied in rats, dogs, and monkeys. ^{14}C-DHBE was administered p.o. at 500 mg/kg in Sprague-Dawley rats or at 30 mg/kg in dogs and monkeys. The tota recovery of radioactivity from urine, feces, gast intestinal tract (tissues + contents), tissues, a carcass ranged from 89.4 to 108% at 10 min to 24 after administration in rats. Ten minutes after administration, the presence of radioactivity was noted in all tissues (blood, brain, heart, kidney liver, lung, skeletal muscle, skin, spleen, and bile) of rats, the highest portions being found i the kidneys and liver (1,122.5 ± 178.7 μg/ml and 707.5 ± 131.6 μg/ml, resp.). The concentration o radioactive material reached peak values in the tissues within the first 30 min and then sharply decreased between the 1st and 2nd hr. The half-life in blood was only 43 min. The amount of ^{14}C-DHBE present in the gastric contents dropped shar to low levels 10-30 min after treatment, while th present in the intestinal contents never increase by more than 5% of the total radioactivity. The radioactivity of the content of the small intesti was always greater than that found in the large intestine and remained at the same level for at least 3.5 hr. These data, together with the find of relatively large amounts of radioactivity in th bile (1,788.2 ± 163.6 and 554.1 ± 26.0 μg/ml at 6 and 120 min, resp.) and of small amounts in the feces, indicate that enterohepatic reabsorption of DHBE occurs. DHBE was excreted mainly by the kidneys, up to 95.6% being found in the urine 24 hr after administration. In dogs, the DHBE half-life was about 1.5 hr. The kidneys eliminated about 90% of total radioactivity within 8 hr. In monkeys, DHBE was also excreted mainly by the kidneys, 90% being excreted within 24 hr. Only small amounts were found in the feces of all species.

4628 THE EFFECT OF FUROSEMIDE ON THE FLOW AND COMPOSITION OF BILE IN THE DOG. (Eng.)

Manny, J.; Krausz, M.; Rabinovici, N. (Hadassah Univ. Hosp., Jerusalem, Israel). *Surg. Gynecol. Obstet.* 144(5):721-726; 1977.

The effect of furosemide, a potent inhibitor of active sodium transport, on the amount and composition of bile was studied in six dogs. Furosemide (10 mg/kg) was injected i.v. into anesthetized dogs with a common bile duct fistula. In all dogs, a 2.5-fold increase in bile flow was observed concomitant with a 15-fold increase in urinary output. The amount of bile flow decreased gradually and returned to control levels 60-75 min after furosemide injection. The choleretic effect was associated with a high increase in sodium, chloride, and bicarbonate anions and with a smaller increase in potassium, phosphorus, and calcium. The most affected ion was sodium, the value being 760.0 ± 4.3 μEq before control and 1,675.0 ± 19.3 μEq 30 min after the injection. The total amount of bilirubin, alkaline phosphatase, and cholesterol was not significantly affected, while the calculated output of potassium, calcium, and phosphorus increased. The results indicate that inhibition of sodium reabsorption by furosemide simultaneously affects the liver and kidneys and that the increase in electrolyte solution is most likely caused by the inhibition of sodium reabsorption in the ductuli. Furosemide may also interfere with the sodium mediated secretory fraction at the canalicular level, but the predominant factor determining the increase in bile flow and electrolytes is inhibition of sodium reabsorption in the biliary ducts and ductuli.

4629 EXPERIMENTAL HEPATOBILIARY TOXICITY OF LITHOCHOLIC ACID: EARLY ULTRASTRUCTURAL CHANGES OF HEPATOCYTES. (Fre.)

Grimaud, J. A.; Peyrol, S.; Paliard, P.; Vachon, A. (Institut Pasteur de Lyon, 77, rue Pasteur, F-69365 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(4):353-360; 1977.

The chronic administration of lithocholic acid leads to a perilobular fibrosis and intrahepatic cholestasis. To discover the initial changes induced by this acid, rabbits were given 150 mg of lithocholic acid daily, p.o., and sacrificed after 10, 20, and 30 days. Electron microscopic studies of their hepatocytes revealed no changes after 10 days and an increase in smooth endoplasmic reticulum after 20 days. After 30 days, there was a further proliferation of the smooth endoplasmic reticulum, together with the appearance of dense intracytoplasmic bodies and modifications of the biliary poles, which contained a clear peribiliary zone with very few microfilaments. These findings show that the initial lesions induced by the chronic administration of lithocholic acid are localized on the canalicular membrane of hepatocytes.

4630 THE PHARMACOLOGY OF PIPROZOLINE. (Ger.)

Herrmann, M.; Birkenmayer, E.; Ganser, V.; Heldt, W.; Steinbrecher, W. (Godecke AG, Mooswaldallee, 7800 Freiburg/Breisgau, W. Germany). *Arzneim. Forsch.* 27(2b):467-475; 1977.

The general toxicological and pharmacological characteristics of the new choleretic drug piprozoline were studied in animals. The acute intragastric LD_{50} was 1,310 mg/kg in male NMRI mice, 1,070 mg/kg in female mice, 3,256 mg/kg in male SIV-50 rats, and 3,640 mg/kg in female rats. Toxic symptoms (ataxia, sedation, intensified respiration, salivation, and tremors) appeared at doses considerably higher than 400 mg/kg. Piprozoline consistently produced a markedly dose-dependent, long-lasting choleretic effect in mice, rats, cats, and dogs that was higher than that of reference drugs (1-phenyl-1-propanol, 1-phenyl-1-hydroxy-n-pentane, and Silymarin). Intraduodenal doses of 25, 50, and 200 mg/kg to rats enhanced bile secretion by 40%, 90%, and 150%, resp. Prophylactically administered piprozoline significantly inhibited liver damage in rats, demonstrated by the significant reduction of hexobarbital-induced sleep in rats with carbon tetrachloride- and galactosamine-induced liver damage and in mice with amanitine-induced liver damage. The pharmacological properties of piprozoline did not interfere with its use as a choleretic. Piprozoline can be considered a true cholepoietic agent in that it increases bile fluid and solids.

4631 STUDIES OF THE INFLUENCE OF PIPROZOLINE ON THE RAT LIVER MICROSOMAL ENZYME SYSTEM. (Ger.)

Friedrich, G.; Vollmer, K. O. (Godecke AG, Abteilung Biochemie, Mooswaldallee, 7800 Freiburg/Breisgau, W. Germany). *Arzneim. Forsch.* 27(2b):517-519; 1977.

The effects of piprozoline on hepatic microsomal enzymes were studied in male SIV-50 and Wistar rats. Piprozoline significantly prolonged hexobarbital-induced sleep (from 20.2 ± 6.8 to 36.7 ± 14.3 min, $p<0.002$), but only when administered in a high dose of 500 mg/kg intragastrically (i.g.) Administration of 3 x 250 mg/kg/day on 4 consecutive days reduced hexobarbital-induced sleep (19.5 ± 3.4 to 13.5 ± 4.6 min, $p<0.005$), indicative of a weak inductive action on the oxidative enzyme system. *In vitro* studies of the microsomal enzyme systems were performed with Wistar rats 15 or 40 hr after the administration of 2 x 250 mg/kg/day i.g. on 4 or 5 consecutive days. The group sacrificed 15 hr after the 5-day treatment showed a significant decrease in aminopyrine *N*-demethylating enzymes (from 11.73 ± 1.6 to 9.85 ± 0.89 mol/mg/min, $p<0.03$) and significant increases in *p*-nitroanisol *O*-demethylating enzymes (4.14 ± 0.57 to 6.93 ± 1.2 mol/mg/min, $p<0.0001$), NADPH-dependent cytochrome-C reductase (55.95 ± 8.7 to 66.27 ± 4.1 mol/mg/min, $p<0.03$), chloramphenicol glucuronidase (1.29 ± 0.14 to 2.40 ± 0.31 mol/mg/min, $p<0.0001$), and *p*-nitrophenol glucuronidase (63.51 ± 16.1 to 102.63 ± 12.2 mol/mg/min, $p<0.002$). Liver weight was increased by 12% compared with controls. The results suggest that piprozoline does not induce the mixed-function oxidase system in man, even after long-term administration.

4632 SUBCELLULAR REACTIONS TO INJURY. I. ULTRASTRUCTURAL AND BIOCHEMICAL INVESTIGATIONS ON THE HEPATIC CELLULAR DAMAGE PRODUCED BY HAEMORRHAGIC SHOCK IN DOGS. (Eng.) Russo, M. A.; Conforti, A.; Bellavia, A.; Grassetti, F. (Pennsylvania Muscle Inst., Univ. Pennsylvania, 51 North 39th St., Philadelphia, PA 19104). *J. Pathol.* 121(2):107-112; 1977.

The morphological and biochemical-biophysical alterations occurring in hepatocytes following hemorrhagic shock were studied in 10 dogs. Hemorrhagic shock was produced by progressive bleeding through an angiographic catheter passed via the femoral vein into the inferior vena cava. The bleeding occurred in two steps. In the first step, a mean arterial blood pressure of 60 mm Hg was obtained in 25 min. This pressure was maintained, with a total loss of blood of 14 ± 3 cm^3/kg by the end of the 1st hr. For the second step, bleeding was accelerated to attain a mean arterial blood pressure of 45 mm Hg by the 20th min of the 2nd hr; this pressure was maintained for the last 40 min. Sublethal hepatocyte damage was evident in the 1st hr of bleeding. Electron microscopy revealed that the most prominent changes occurred in the mitochondria. High-amplitude swelling, fragmentation of the cristae, irregular density of the matrix, and diminution or disappearance of the granules were seen. The rough endoplasmic reticulum showed fragmentation, degranulation, and apparent formation of membranous whorls and clusters of vesicles. Autophagocytic vacuoles containing glycogen, membranes, and other cellular components were seen. Double membrane whorls at the biliary pole of the cell and disappearance of the microvilli were also seen after 1 hr. After the 2nd hr of bleeding, cariolysis and dispersion of the nucleolar components were observed in the hepatocyte nucleus, and vacuolization and other damage was seen in the cytoplasm. The blood pO_2 and O_2 consumption decreased significantly during bleeding, while the blood glucose and lactate concentrations rose. The lactate/pyruvate ratio increased in parallel with the O_2 level of the blood, being 11.6 before bleeding, 19.4 after 1 hr, and 32.0 after 2 hr. The results indicate that experimentally induced hemorrhagic shock produces cellular damage by three main mechanisms: anoxia, hemodynamic alterations, and metabolite deprivation.

4633 EFFECT OF d-LIMONENE AND RELATED COMPOUNDS ON BILE FLOW AND BILIARY LIPID COMPOSITION IN RATS AND DOGS. (Eng.) Kodama, R.; Inoue, H.; Noda, K.; Ide, H.; Yamamoto, H.; Yoshihara, S.; *et al.* (Hisamitsu Pharmaceutical Co. Inc., Tosu, Saga, Japan). *Life Sci.* 19(10):1559-1568; 1976.

The effect of d-limonene and related compounds on bile flow was investigated to assess their potential as choleretic agents. d-Limonene enhanc bile flow in rats and dogs with a dose-response correlation. Three to four hours after the admini tration of 850 mg/kg d-limonene, bile flow increas to about 160% ($p<0.01$) of the control value of 79 ± 14 μl (this latter value represents a 1-hr colle tion just prior to drug administration). The chol eretic activity of the hydroxyl metabolites of d-limonene e.g., *p*-mentha-1,8-dien-10-ol, *p*-menth ene-8,9-diol, and *p*-mentha-1,8-dien-6-ol was much higher ($p<0.01$) than that of d-limonene. The ran of bile flow for these compounds (250 mg/kg) was 170-230% of the controls (788 ± 24 μl/hr); *p*-ment 1-ene-8,9-diol was the most effective. The choleretic activities of esters of *p*-menth-1-ene-8,9-diol with acetic, propionic, and nicotinic acids (1.47 mmol/kg, corresponding to 250 mg/kg of orig inal diol) enhanced bile flow, but to a lesser ex tent than the original diol in rats ($p<0.01$) and to a higher extent than the original diol in dogs d-Limonene decreased the ratio of bile salts and phospholipids to cholesterol ($p<0.05$), whereas *p*-menth-1-ene-8,9-diol increased it ($p<0.05$). It is suggested that *p*-menth-1-ene-8,9-diol may b useful both as a drug for the prevention and treatment of human cholelithiasis and as a choler tic agent.

4634 FACTORS AFFECTING LIVER LIPID CONTENT I PYRIDOXINE-DEFICIENT RATS. I. DIETARY PROTEIN LEVELS. (Eng.) Suzuki, K.; Nakamura, T. Fujita, M.; Iwami, T.; Abe, M.; Okada, M. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *J. Nutr. Sci. Vitaminol.* 22(4):291-298; 1976.

The effects of choline fortification and various dietary protein levels on liver lipid content in pyridoxine-deficient male Wistar rats were invest gated. When rats were fed a 70% casein, pyridox deficient diet fortified with 4 g/kg choline ins of the standard 2 g/kg choline, the liver lipid content was not decreased (7.18 ± 1.13% and 7.22 0.67% for rats receiving 4 g/kg and 2 g/kg choli resp.). Reducing the protein level in pyridoxin deficient diets decreased the extent of liver li accumulation (7% versus 5% liver lipid content i rats fed 70% or 10-30% casein diets, resp.). A highly negative correlation ($p<0.05$) was observe between liver lipid content and liver glutamic pyruvic transaminase activity, indicating that t fatty infiltration of the liver may be intimatel related to the pyridoxine deficiency state. In studies of the time course of fatty liver develo ment in rats fed 70% casein diets with (controls or without pyridoxine, rats deficient in pyridox showed a rise in liver lipid content within 1 we it was increased to 2.3 times that of the pair-f controls at 3 weeks. Control rats maintained no mal lipid levels. When rats were fed a 20% case pyridoxine-free diet or a 70% casein, pyridoxine-supplemented diet for 2 days following a 70% casein, pyridoxine-free diet for 19 days, liver lipid content was decreased in both groups from about 10% to about 6%. Control rats fed the 70% casein, pyridoxine-free diet continuously showed a further increase in lipid content (reaching about 11% by the 21st day of feeding). Although the liver lipid content was decreased in rats fed the 70% casein, pyridoxine-supplemented diet, significant liver enlargement was observed. These results indicate that pyridoxine deficiency may not be directly responsible for liver lipid accumulation. Increased carbohydrate intake along with the attendant change in hormonal conditions may be contributing factors. At present, it is only possible to say that the fatty infiltration of liver is due to a disturbance of homeostasis in the regulatory system of hepatic lipid metabolism under severe pyridoxine deficiency.

4635 DOSE-DEPENDENT DISPOSITION OF THE CARDIAC GLYCOSIDES OUBAIN AND K-STROPHANTHOSIDE IN RAT LIVER. CONSEQUENCES FOR (Na^+, K^+)-ATPase INHIBITION AT SINUSOIDAL AND CANALICULAR SITES [Abstract]. (Eng.) Meijer, D. K. F.; Keulemans, K.; Weitering, J. G.; Vonk, R. J. (Dept. Pharmacology, State Univ. of Groningen, Groningen, Netherlands). *Digestion* 14(5/6):475; 1976.

4636 EFFECT OF ACETAMINOPHEN ON LIVER MICROSOMAL DRUG-METABOLIZING ENZYME IN VITRO IN MICE [Letter to Editor]. (Eng.) Aikawa, K.; Satoh, T.; Kitagawa, H. (Dept. Biochemical Pharmacology, Chiba Univ., Chiba, Japan). *Biochem. Pharmacol.* 26(9):893-895; 1977.

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4638 ETHANOL INCREASED LIVER γ-GLUTAMYLTRANSPEPTIDASE (γ-GT) [Abstract]. (Eng.) Ronchi, G.; Ideo, G. (Inst. Clinical Medicine [III], Univ. Milan, Milan, Italy). *Digestion* 14(5/6): 544; 1976.

4639 THE RELATIVE EFFECTS OF A LOW-PROTEIN-HIGH-CARBOHYDRATE DIET ON THE FREE AMINO ACID COMPOSITION OF LIVER AND MUSCLE. (Eng.) Lunn, P. G.; Whitehead, R. G.; Baker, B. A. (Dunn Nutritional Labs., Milton Rd., Cambridge CB4 IXJ, England). *Br. J. Nutr.* 36(2):219-230; 1976.

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4644 EVIDENCE FOR A CORRELATION BETWEEN BILE SALT INDEPENDENT FRACTION OF BILE FLOW AND BILIARY EXCRETION OF THE ORGANIC ANION IOGLYCAMIDE [Abstract]. (Eng.) Klapdor, R. (I. Medizinische Universitatsklinik, Hamburg, W. Germany). *Digestion* 14(5/6):527; 1976.

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4646 ALTERATIONS IN BILE FLOW AND Na^+-K^+ BILIARY SECRETION INDUCED BY THEOPHYLLINE AND ETHACRYNIC ACID [Abstract]. (Eng.) Knodell, R. (Div. Gastroenterology, Univ. New Mexico, Albuquerque, NM). *Clin. Res.* 25(2):110A; 1977.

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4648 FLAVASPIDIC ACID (FLAV): EFFECTS ON OXIDATIVE PHOSPHORYLATION AND FATTY ACID

(FA) UTILIZATION IN ISOLATED HEPATOCYTES [Abstract]. (Eng.) Burnett, D. A.; Ockner, R. K. (Univ. California, San Francisco, CA). *Clin. Res.* 25(3):467A; 1977.

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4660 THE EFFECT ON DNA-SYNTHESIS IN LIVER AND TUMOUR CELLS OF TEMPORARY OCCLUSION OF T HEPATIC ARTERY [Abstract]. (Eng.) Jeppsson, B.; Fredlund, P. E.; Dahl, E. P. (Kirurgiska kliniken, Lasarettet, 221 85 Lund, Sweden). *Eur. Surg. Res.* 9(Suppl. 1):48-49; 1977.

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THEORY [Abstract]. (Eng.) Wood, A. J. J.; Villeneuve, J. P.; Rogers, L. W.; Branch, R. A.; Shand, D. G. (Vanderbilt Univ., Nashville, TN). *Clin. Res.* 25(3):321A; 1977.

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4667 EFFECTS OF GLYCOGEN ON EXTRACTION OF SOLUBLE GLYCOGEN SYNTHASE, PHOSPHORYLASE AND PROTEIN KINASE FROM NORMAL AND DIABETIC LIVER [Abstract]. (Eng.) Miller, T. B., Jr. (Univ. Massachusetts Medical Sch., Worcester, MA 01605). *Fed. Proc.* 36(3):608; 1977.

4668 EXPERIMENTAL PRODUCTION OF CEREBRAL OEDEMA IN AN ANIMAL MODEL OF FULMINANT HEPATIC FAILURE AND EFFECTS OF VARIOUS TREATMENT MEASURES [Abstract]. (Eng.) Hanid, M. A.; Mackenzie, R. L.; Mellon, P. J.; Williams, R. (Kings Coll. Hosp. Medical Sch., London, England). *Digestion* 14(5/6):517; 1976.

4669 ROLE OF HEPATIC TRIGLYCERIDE LIPASE (H-TGL) DEFICIENCY IN THE ACCUMULATION OF LIPOPROTEIN (Lp) REMNANTS IN GALACTOSAMINE (GaLN) HEPATITIS [Abstract]. (Eng.) Kinnard, M. S.; Ragland, J. B.; Kuiken, L.; Sabesin, S. M. (Div. Gastroenterology, Univ. Tennessee, Memphis, TN). *Clin. Res.* 25(3):313A; 1977.

4670 PLASMA DISAPPEARANCE OF RADIOLABELED BILE ACIDS IN HEALTHY SUBJECTS, LIVER DISEASE AND IN GALLSTONE PATIENTS BEFORE AND AFTER TREATMENT WITH CDCA [Abstract]. (Eng.) Roda, E.; Roda, A.; Sama, C.; Festi, D.; Mazzella, G.; Aldini, R.; *et al.* (Cattedra di Gastroenterologia dell'Universita di Bologna, Bologna, Italy). *Digestion* 14(5/6):545; 1976.

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4672 CONGENIC STRAINS OF MICE SUSCEPTIBLE AND RESISTANT TO MOUSE HEPATITIS VIRUS. (Eng.) Weiser, W.; Vellisto, I.; Bang, F. B. (Johns Hopkins Univ., Sch. Hygiene and Public Health, Baltimore, MD 21205). *Proc. Soc. Exp. Biol. Med.* 152(4):499-502; 1976.

4673 ACINAR DISTRIBUTION OF BROMOBENZENE INDUCED HEPATIC NECROSIS IN THE RAT: A DOUBLE EMBEDDING TECHNIQUE FOR ELECTRON MICROSCOPY [Abstract]. (Eng.) Miller, D. L.; Harasin, J. M.; Gumucio, J. J. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Clin. Res.* 25(3):315A; 1977.

4674 EFFECT OF Schistosoma mansoni INFECTION ON THE HEPATIC DRUG-METABOLIZING CAPACITY OF MICE. (Eng.) Cha, Y. N.; Edwards, R. (Johns Hopkins Univ., 615 N. Wolfe St., Baltimore, MD 21205). *J. Pharmacol. Exp. Ther.* 199(2):432-440; 1976.

See also, 4714, 4731, 4877, 4972, 5007, 5023, 5026, 5061, 5088, 5109, 5140, 5143, 5238.

SECRETION AND METABOLISM

Intestine

675 COMPENSATION BY THE RESIDUAL INTESTINE AFTER INTESTINAL RESECTION IN THE RAT. I. INFLUENCE OF POSTOPERATIVE TIME INTERVAL. (Eng.) Hanson, W. R.; Osborne, J. W.; Sharp, J. G. (Div. Biological and Medical Res., Argonne Natl. Lab., Argonne, IL 60439). *Gastroenterology* 72(4):701-705; 1977.

The sequence of events comprising the early response of the residual intestine to 70% resection of the combined jejunum and ileum was investigated to gain further information on the mechanisms involved. Animals were killed at 2, 4, 6, 8, and 12 postoperative days. Marked increases in DNA synthesis (expressed as disintegrations/min/crypt), cells per crypt column, labeled cells per crypt column, thickness of intestinal wall components, and cells per villus column were apparent as early as 2 to 4 postoperative days. By 12 days, the values had reached the 30-day postoperative levels found in earlier experiments, indicating that a new steady state had already been reached. Jejunal and ileal crypts responded in almost identical ways during the first 12 days with their sizes increasing to about 150% of control values. However, although jejunal villus cell counts increased to 125% of controls, the ileal villus cell counts increased to 180% of controls, indicating that the sizes of the two crypt and villus epithelial cell populations are independently controlled.

4676 LYMPHOID CELLS OF INTESTINAL MUCOSA POSSESSING BOTH KAPPA AND LAMBDA SPECIFICITIES IN NORMAL SUBJECTS. (Fre.) Hartmann, L.; Liacopoulos, P. (Institut biomedical des Cordeliers 15, rue de l'Ecole de Medecine, 75270 Paris Cedex 06, France). *C. R. Soc. Biol. (Paris)* 284(10):863-866; 1977.

Lymphoid cells possessing both kappa and lambda specificities were observed in the intestinal mucosa of three normal subjects. Intestinal mucosa biopsies were taken by means of a Debray tube and subjected to fluorescent and immunofluorescent studies. All three samples showed a particular number of bipotential cells: the total cell population comprised of kappa + lambda cells in the three samples was 8, 21, and 46% or 3,100, 7,000, and 30,500 cells/μl. The percentage of kappa cells comprised 15, 44, and 73% of the total cell populations, whereas lambda cells accounted for 6, 39, and 48% of the total cell population in the three samples. This variability in lymphoid cells seems to be characteristic and may reflect the high activity of the immune system in the small intestine.

4677 FREE ENDOGENOUS AMINO ACIDS IN PERFUSED RAT INTESTINE. (Spa.) Otero, M. A.; Mataix, F. J.; Varela, G. (Departamento de Nutricion, Facultad de Veterinaria, Ciudad Universitaria, Madrid-3, Spain). *Rev. Esp. Fisiol.* 32(1):47-52; 1976.

Levels of endogenous free amino acids were measured in rat small intestine during saline and glutamic acid perfusions; the contribution of biliary and pancreatic secretions to these amino acid levels was determined by ligating choledochol and pancreatic ducts to the perfused intestine. In 50 rats in which pancreatic secretions were excluded, perfused material contained only trace amino acids, indicating that the major contribution to the free amino acid levels in the intestine is pancreatic secretion. Male Wistar rats (250-300 g) were fasted for 48 hr, anesthetized with sodium pentobarbital
(50 mg/100 g body weight) and intestinally perfuse
with 20 ml sodium chloride (9%) or L-glutamic acid
(0.5 and 1.0 mM in saline) at a rate of 13 ml/hr.
Levels of essential amino acids (threonine, valine
isoleucine, phenylalanine, lysine, and histidine)
were highest with saline perfusion (11.22 ± 0.84
μmol/20 ml perfusate) and decreased with increasin
glutamic acid level (8.08 ± 0.54 and 6.72 ± 0.60
μmol/20 ml perfusate for 0.5 and 1.0 mM glutamic
acid, resp.). Free methionine was not found in a
preciable amounts. Glutamic acid in the perfusat
did not decrease levels of nonessential amino aci
as markedly as it did the levels of essential ami
acids.

4678 INTESTINAL ENZYMES [sic] ACTIVITIES IN
ISOLATED VILLUS AND CRYPT CELLS DURING
POSTNATAL DEVELOPMENT OF THE RAT. (Eng.) Raul,
Simon, P.; Kedinger, M.; Haffen, K. (Unite 61 INS
Avenue Moliere, F-67200 Strasbourg-Hautepierre,
France). *Cell Tissue Res.* 176(2):167-178; 1977.

The developmental pattern of various intestinal
enzyme activities was studied in villus and crypt
cells of normal Wistar rats from 5 days to 8 week
after birth. Alkaline phosphatase and enterokina
activities were always located in the upper villu
zone during postnatal development. Enterokinase
activity was higher in the upper villus cells dur
the 3rd week of life than after this period. Ami
peptidase activity was located in the crypt cells
during the 1st week. Its maximum activity remain
in this area until the 3rd week. At this time,
sucrase activity appeared in the crypt cells. Am
peptidase and sucrase activities rose to the vill
zone during the 4th week. Amylase activity was
detected along the entire crypt-villus axis 5 day
after birth (8 mU/mg protein). Its activity in t
crypt cells reached a maximum at the end of the
1st week and in the upper villus cells, after the
4th week. In contrast with the other enzymes stu
almost all amylase activity was soluble in the
youngest animals, whereas at weaning, most of the
activity appeared in a particulate form in the
villus cells. In the crypt cells, the ratio betw
particulate and soluble form remained unchanged
until the adult stage.

4679 PHOSPHOLIPASE ACTIVITY OF RAT INTESTINE
MODE OF ACTION. (Fre.) Bonnefis, M. J
Rey, G.; Thouvenot, J. P.; Douste-Blazy, L. (Hopi
Purpan, 31052 Toulouse-Cedex, France). *Biochemie*
59(4):355-361; 1977.

Phospholipase (PP) activities of rat intestinal m
cosa homogenates were determined from radioactive
labeled lysophosphadidylcholines (LYS)-^{14}C and
phosphatidylcholines (PH)-^{3}H-^{14}C. The effects of
pH and the duration of incubation on PP activitie
were studied. A study of PP activities with a
mixture of 1-acyl-2-lineoleyl-[1-^{14}C]-glycero-3-
phosphorylcholine and 1-palmityl-[9,10-^{3}H$_2$]-2-acy
glycero-3-phosphorylcholine showed that between p
6.5 and 7.0 both fatty acids (palmitic and linoleic acids) were liberated simultaneously withou
the formation of lyso derivatives. The liberati

of linoleic acid remained constant between pH 7.5 and 9.5 while the liberation of palmitic acid decreased rapidly as the pH was raised. LYS activity on 1-acyl-glycero-3-phosphorylcholine-^{14}C was optimum at pH 6.5. Thus, at pH 6.5 a PP-B activity occurs, between pH 6.5 and 9.0 all activities are in a decreasing phase, and at pH 9.0 only a PP-A$_2$ activity exists. Under these conditions it seems that the PP-B activity found at pH 6.5 can be considered as a result of an A$_2$ activity. The specific activity of lysophospholipase was five times greater than that of PP-type B. Tests with the addition of sodium deoxycholate and an excess of LYS also showed that the total PP activities of rat intestinal mucosa results from a PP-A$_2$ and a LYS-A$_1$ activity.

4680 ESTEROLYTIC ACTIVITIES OF RAT INTESTINAL MUCOSA. 2. PURIFICATION AND PROPERTIES OF A GLYCEROL-ESTER HYDROLASE.

(Eng.) Fernandez-Lopez, V.; Serrero, G.; Negrel, R.; Ailhaud, G. (Departamento di Catalisis, Consejo Superior de Investigaciones Cientificas, Serrano 119, Madrid-6, Spain). *Biochem. Eur. J.* 71(1):259-270; 1976.

The physical properties and activities of a glycerol-ester hydrolase (GEH) from the mucosal scrapings of rat jejunum were examined to define a possible role for the enzyme in lipid degradation. The enzyme was purified by chromatography on carboxyhexanoyl-Sepharose-glyceryl dioctanoate and by gel electrophoresis. A single band with a molecular weight of 68,000 was isolated. The GEH was most active against glyceryl tributyrate at pH 8.0-8.5, with an activation energy of 8.7 kcal/mol (36.4 kjoules/mol). Its substrate specificity is mainly directed against glycerol esters and primary monoalcohols. The enzyme is similar to liver esterase and pancreatic lipase in its substrate specificities, probably occupying an intermediary position between the two. Similarly to pancreatic lipase but not to liver esterase, GEH, was inhibited by bile salts. However, inhibition of GEH was only partial under physiological concentrations of bile salts, and these salts do not occur in the mucosal cells, where the enzyme is frequently located. GEH was stable between pH 4.5-9.0, which means that it probably remains at least partially active *in vivo*. It was concluded that GEH may, either intra- or extracellulary, complement the role of pancreatic lipase in degrading short- and medium-chain triglycerides.

4681 ESTIMATION OF FAT ABSORPTION FROM SINGLE FECAL SPECIMENS USING ^{131}I-TRIOLEIN AND ^{75}Se-TRIETHER. A STUDY IN RATS WITH AND WITHOUT INDUCED STEATORRHEA.

(Eng.) Hoving, J.; Wilson, J. H. P.; Valkema, A. J.; Woldring, M. G. (Univ. Hosp., Groningen, Netherlands). *Gastroenterology* 72(3):406-412; 1977.

The simultaneous use of ^{131}I-triolein and ^{75}Se-triether in a single p.o. dose to estimate fat absorption from incomplete fecal collections was tested in rats with and without steatorrhea induced by biliary fistula or with intestinal ischemia. The total fecal recoveries in normal rats of ^{75}Se and ^{3}H were 98.8 ± 1.8 and 86.8 ± 9.0%, resp. The results in normal rats showed that analysis of single stool samples allows a valid estimate of fat absorption as defined by the balance study based on the total fecal recovery of ^{131}I. However, in normal rats with poor absorption, the absorption values from successively excreted stools showed a tendency to increase. The rats with biliary fistula absorbed the intragastric dose of fat to a considerably lower extent as compared with the controls. No significant difference was observed between the absorption of ^{131}I-triolein and ^{14}C-triether, the respective values being 37.6 ± 7.8 and 38.5 ± 14.0%. The absorption values from successively excreted stools in these animals tended to increase. No evidence of different intestinal transit rates of test fat and marker was observed in bile-diverted rats, suggesting that the observed inconsistency in fat absorption values from different stool specimens reflects intraprandial differences in the absorption of fat. The studies on rats with intestinal ischemia did not support the suggestion that separation of fat and triether occurs if a mucosal defect is involved as the cause of fat malabsorption. It is concluded that this dual isotope technique may be useful in the clinical estimation of fat absorption, as it offers important technical advantages over conventional fat balance studies.

4682 PROTEIN TURNOVER IN INTESTINAL MUCOSAL VILLUS AND CRYPT BRUSH BORDER MEMBRANES.

(Eng.) Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Biochem. Biophys. Res. Commun.* 75(1):130-135; 1977.

Relative turnover rates of intestinal brush border proteins were studied by a double-label technique. Brush borders were isolated from cells at all levels along the villus, and from the crypts. Proteins with large molecular weight (>150,000 daltons) demonstrated more rapid turnover compared with other brush border proteins at all levels along the villus. This rapid turnover was not seen in crypt brush borders. These findings support the concept of protein turnover in intestinal brush borders, and demonstrate differences between the proteins in rapidly growing crypt cells. and in non-growing villus cells.

4683 EFFECT OF ALCOHOL ON THE RELEASE OF SECRETIN AND PANCREATIC SECRETION.

(Eng.) Llanos, O. L.; Swierczek, J. S.; Teichmann, R. K.; Rayford, P. L.; Thompson, J. C. (Universidad Catolica de Chile, Santiago, Chile). *Surgery* 81(6):661-667; 1977.

The effect of alcohol on the release of secretin was studied in 21 human subjects by radioimmunoassay and in dogs and cats by radioimmunoassay and bioassay (pancreatic secretion of water and bicarbonate). In man, plasma secretin levels increased significantly from a basal level of 121 ± 14 to 164 ± 24 pg/ml at 60 min after p.o. ingestion of 40% alcohol (60 ml). The intraduodenal administration of alcohol in man, dogs, and cats did not release secretin or affect pancreatic water and bicarbonate secretion in dogs and cats, but pancreatic protein output was increased moderately in these two species. Plasma gastrin levels rose significantly from a basal level of 52 ± 4 to 64 ±3 pg/ml after ingestion of alcohol in man and from 33 ± 5 to 51 ± 8 pg/ml after administration of alcohol into the stomach of dogs. Administration of alcohol into the duodenum in man, dogs, and cats did not release gastrin. Alcohol probably does not release secretin directly. The mechanism of release of secretin in man is unknown, but it clearly involves the stomach and may be mediated via the release of gastric acid.

4684 EFFECT OF CAFFEINE ON THE HUMAN SMALL INTESTINE. (Eng.) Wald, A.; Back, C.; Bayless, T. M. (Dept. Medicine, Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Gastroenterology* 71(5):738-742; 1976.

The influence of caffeine on net secretion and fluid transit time in the human small intestine was studied to relate normal levels of caffeine consumption to possible laxative or diarrheal effects. Eleven healthy volunteers who had no previous history of diarrhea associated with caffeine ingestion were chosen. Caffeine was administered p.o. or through a triple lumen tube into the jejunum in a 100-ml saline solution containing polyethylene glycol. Transit times were estimated by determining the dilution curve of an injected dye. Both oral and direct jejunal administration of caffeine in 75- to 300-mg doses resulted in net secretion of fluid into the jejunal and ileal lumens within 15 and 35 min, resp. The basal jejunal absorption rate of 0.5 ml/cm/hr was reversed to a net secretion rate of 6.0 ± 2.2 ml/cm/hr in five studies ($p<0.01$). The delayed onset of ileal secretion was correlated with transit time of the caffeine bolus and not with plasma caffeine levels. Fluid transit time was either not affected or was slightly prolonged with repeated injections of caffeine. This study confirms the hypersecretory effects of caffeine on the small intestine observed previously in animals. The fact that fluid transit time was unaffected in the volunteer group may be due to the smooth muscle relaxant effect of caffeine on the intestine, thereby increasing its capacity. A possible relationship between caffeine ingestion and functional diarrhea in some individuals is discussed.

4685 COMPENSATORY POSTRESECTIONAL HYPERPLASIA AND STARVATION ATROPHY IN SMALL BOWEL: DISSOCIATION FROM ENDOGENOUS GASTRIN LEVELS. (Eng.) Oscarson, J. E. A.; Veen, H. F.; Williamson, R. C. N.; Chir, B.; Ross, J. S.; Malt, R. A. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 72(5):890-895; 1977.

Because exogenous gastrin has been implicated as a tropic hormone for mucosal cells of the intestinal tract and as a regulator of mucosal growth, the effects of 23-fold variations of serum gastrin produced by various gastric operations were studied in Sprague-Dawley rats. The gastric operations included pyloroplasty, vagotomy and pyloroplasty, antrectomy, and fundectomy. Animals that had undergone one of these operations were randomly allocated
to have jejunal resection or sham operation. Gas-
trin levels for each operation were consistent, i
respective of transection (sham-operation) or re-
section of the gut. Despite increases of 35% to
82% in the amount of RNA in mid-small bowel mucos
2 days after jejunal resection, there was no cor-
relation with the level of serum gastrin. The DN
content of the mid-small bowel increased 35% to 5
in normal rats and after pyloroplasty, vagotomy a
pyloroplasty, and antrectomy, but not after funde
tomy. Increases in the amount of radioactivity i
mid-small bowel mucosa after jejunectomy were pre
ent after all operations but vagotomy-pyloroplast
these increases ranged from 69% to 146%, but did
not correlate with serum gastrin levels. Signif-
icant increases in the specific activity of DNA
in normal rats and in rats after pyloroplasty and
fundectomy did not correlate with gastrin levels.
The gastric operations changed the serum gastrin
level without affecting villus height or crypt
depth, and resections increased height and depth
without affecting serum gastrin. High endogenous
concentrations of serum gastrin did not prevent
loss of RNA and DNA during starvation and did not
affect DNA specific activity. Tropic effects dis
to the duodenum produced by exogenous gastrin and
pentagastrin may be results of supranormal levels
of these compounds.

4686 INTESTINAL MUCOSA IN RATS WITH IRON DEF
CIENCY ANEMIA. (Fre.) Salazar de Sous
J.; Bray Pinheiro, J.; Fernanda Torgal Garcia, M.
Viginia Rebocho Pais, M.; Nunes, V. (Clinique
pediatrique, Hopital de Santa Maria, Lisbon, Port
gal). *Helv. Paediatr. Acta* 31(2):167-171; 1976.

The effects of iron deficiency on the rat intest
mucosa were studied. Two groups of nine rats eac
received either milk supplemented (controls) wit
Fe (0.5 mg/day) and Cu (0.05 mg/day) or unsupple-
mented milk for 2 months. They were then sacrif
for hematological and biochemical evaluation. T
appearance of the gastric and jejunal mucosa was
normal in both groups. However, animals that di
not receive Fe or Cu had very marked anemia, and
epithelial cell height was significantly higher
in these animals compared with controls ($p<0.001$
The relationship between Fe deficiency and struc
alterations of the intestinal mucosa in children
has not been elucidated.

4687 THE DUODENUM IS AN IMPORTANT REGULATOR
LOWER ESOPHAGEAL SPHINCTER PRESSURE (L
IN THE DOG [Abstract]. (Eng.) Koelz, H. R.; Le
sien, G.; Weiser, H. F.; Sauberli, H.; Largiader,
Siewert, R.; *et al.* (Dept. Surgery, Univ. Gotti
Gottingen, W. Germany). *Gastroenterology* 72(5,
Part 2): 1082; 1977.

4688 EFFECT OF BILE AND PANCREATIC FLOW INT
THE ILEUM ON JEJUNAL AND ILEAL MUCOSA
[Abstract]. (Eng.) Weser, E.; Tawil, T.; Drumm
A. (Univ. Texas Health Science Center, San Anton
TX). *Gastroenterology* 72(5, Part 2):1149; 1977.

4689 EPITHELIAL KINETICS IN SMALL INTESTINE OF ORALLY VS INTRAVENOUSLY ALIMENTED RATS [Abstract]. (Eng.) Assad, R. T.; Eastwood, G. L. (West Roxbury Veterans Admin. Hosp., Boston, MA). *Clin. Res.* 25(3):306A; 1977.

4690 EFFECT OF CHANGES IN BLOOD FLOW ON INTESTINAL ENZYME SECRETION [Abstract]. (Eng.) Fara, J. W.; Campbell, R. (Health Sciences Center, SUNY, Stony Brook, NY 11794). *Fed. Proc.* 36(3): 456; 1977.

4691 SUBCELLULAR DISTRIBUTION OF DI- AND TRI-PEPTIDASE IN HUMAN JEJUNUM [Abstract]. (Eng.) Nicholson, J. A.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 52(2): 16P; 1977.

4692 GAMMA-GLUTAMYL TRANSPEPTIDASE OF RAT AND HUMAN INTESTINE: GREATER ENHANCEMENT OF ACTIVITY BY DIPEPTIDES THAN BY AMINO ACIDS OR LONGER PEPTIDES [Abstract]. (Eng.) Smith, R. L.; Heizer, W. D. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC). *Gastroenterology* 72(5, Part 2):1134; 1977.

4693 PORCINE MOTILIN RELEASE [Abstract]. (Eng.) Modlin, I. M.; Mitznegg, P.; Bloom, S. R.; Polak, J. (Royal Postgraduate Medical Sch., London, W12 OHS, England). *Eur. Surg. Res.* 9(Suppl. 1):153; 1977.

4694 IDENTIFICATION OF LIPIDS FOR INTESTINAL ABSORPTION STUDIES IN RESIN-EMBEDDED TISSUE. (Eng.) Snipes, R. L. (Zentrum fur Anatomie und Cytobiologie der Justus Liebig-Universitat, Aulweg 123, D-6300 Giessen, W. Germany). *Microsc. Acta* 79(2):127-130; 1977.

4695 EFFECT ON SMALL INTESTINAL FUNCTION AND STRUCTURE OF CHRONIC COLONIZATION BY ENTEROTOXIGENIC COLIFORM BACTERIA IN GERMFREE RATS [Abstract]. (Eng.) Klipstein, F. A.; Goetsch, C. A.; Short, H. B.; Engert, R. F.; Schenk, E. A. (Univ. Rochester, Sch. Medicine, Rochester, NY). *Gastroenterology* 72(5, Part 2):1081; 1977.

4696 INFLUENCE OF HIGH AND LOW FIBRE DIET ON INDUCTION OF COLORECTAL TUMOURS IN THE RAT USING DIMETHYLHYDRAZINE HCl [Abstract]. (Eng.) Carachi, R.; Busuttil, A.; Joffe, S. N. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A410-A411; 1977.

4697 IgA CONTENT OF INTESTINAL EPITHELIUM AND SECRETED FLUID IN EXPERIMENTAL CHOLERA [Abstract]. (Eng.) Hamilton, S. R.; Keren, D. F.; Boitnott, J. K.; Yardley, J. H. (Johns Hopkins Medical Inst., Baltimore, MD 21205). *Fed. Proc.* 36(3):1054; 1977.

4698 ADAPTATION OF THE SHORTENED GUT: TRANSFER OF A HUMORAL AGENT BY CROSS-CIRCULATION [Abstract]. (Eng.) Williamson, R. C. N.; Buckholtz, T. W.; Malt, R. A. (Massachusetts General Hosp., Boston, MA 02114). *Gut* 18(5):A413; 1977.

4699 METABOLISM OF THE ORTHOTOPICALLY TRANSPLANTED TOTAL SMALL BOWEL IN THE RAT BEFORE AND DURING REJECTION [Abstract]. (Eng.) Keulen, H. J. M. M.; Kort, W. J.; de Both, N. J.; Westbroek, D. L. (Lab. Experimental Surgery, Erasmus Univ., Rotterdam, Netherlands). *Eur. Surg. Res.* 8(Suppl. 2):65-66; 1976.

See also, 4489, 4497, 4507, 4509, 4545, 4573, 4618, 4700, 4701, 4702, 4708, 4709, 4714, 4715, 4863, 4903, 4912, 4923, 4978, 5178, 5242.

GENERAL

4700 COMPARISON OF VASCULAR EFFECTS OF GASTROINTESTINAL HORMONES ON VARIOUS ORGANS. (Eng.) Chou, C. C.; Hsieh, C. P.; Dabney, J. M. (Dept. Physiology, Michigan State Univ., East Lansing, MI 48824). *Am. J. Physiol.* 232(2):H103-H109; 1977.

The vascular effects of raising the local arterial concentrations of pentagastrin (2-1,500 ng/ml), secretin (0.2-150 mU/ml), and cholecystokinin (0.2-150 mU/ml) in the duodenum, jejunum, heart, kidney, forelimb, spleen, and the skin and muscle of the forelimb were studied in 54 anesthetized dogs. Secretin produced similar vasodilation in all organs. The minimal increment in local blood secretin concentration for vasodilation (concentration requirement) was 7-32 mU/ml. Pentagastrin produced vasodilation only in the duodenum and jejunum, and the concentration requirement was 25-50 ng/ml. The vascular resistance of the forelimb, skin, or muscle was not affected by cholecystokinin. In the heart, kidney, and spleen, cholecystokinin produced vasodilation but the concentration requirement was above 21-33 mU/ml. In contrast, vasodilation in the duodenum and jejunum appeared when cholecystokinin concentration was increased by only 2.5 mU/ml. Almost all its vasodilating effect occurred below an increment of 10 mU/ml. Comparison of these data with the reported cardiovascular adjustments and blood concentration of gastrointestinal hormones following a meal suggests that cholecystokinin may contribute to postprandial intestinal hyperemia.

4701 ENKEPHALIN-LIKE IMMUNOREACTIVITY IN THE HUMAN GASTROINTESTINAL TRACT.

(Eng.) Polak, J. M.; Bloom, S. R.; Sullivan, S. N.; Facer, P.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London W12 OHS, England). *Lancet* 1(8019):972-974; 1977.

Samples of human gastrointestinal tract (gastric body and antrum, duodenum, jejunum, ileum, colon, pancreas, gallbladder, cystic ducts, and bile duct) were examined immunocytochemically for the presence of peptides with opiate-like actions. Enkephalin immunoreactivity was detected in high concentrations in the gastrointestinal tract; the largest amount was found in the antral mucosa (79 ng/g), with lesser amounts in the upper small intestine. In the antrum, approximately equal amounts were found in the mucosa as were extractable from the rest of the stomach wall. Enkephalin was not detected in the fundic mucosa, and the larger endorphin species were not detected anywhere in the gut. Numerous endocrine cells stained specifically with antibodies to *met*-enkephalin in the midzone of the antral mucosa. Enkephalin cells appeared to correspond to the antral gastrin cells but not to the somatostatin or other cells in the same region. Nerve fibers of the myenteric plexus of the gallbladder cystic duct wall and lower intestine were also stained with antibodies to *met*-enkephalin. Gastrointestinal physiology appears to be partly regulated by locally acting hormones, and enkephalin may be one of these. The established effects of morphine on the alimentary tract provide a clue to the possible physiological role of enkephalin.

4702 GASTROINTESTINAL ANTIBODY RESPONSES IN AXENIC MICE TO TOPICALLY ADMINISTERED **Escherichia coli.**

(Eng.) Ebersole, J. L.; Molinari, J. A. (Forsyth Dental Center, Boston, MA 02115). *Infect. Immun.* 16(3):938-946; 1977.

Studies were carried out to determine whether the topical administration of nonviable *Escherichia coli* was capable of eliciting a gastrointestinal humoral immune response in axenic mice. In addition, the kinetics, specificity, and classes of antibodies produced in the intestinal secretions after p.o. sensitization were examined. Axenic animals received nonviable *E. coli* O111:B4 by topical application into the oral cavity. IgA, IgG1, and IgG2 were detected in the gastrointestinal secretions, with an apparent gradation in stability (IgA>IgG1>IgG2). Specific antibodies (IgA and IgG) to both the somatic and the flagellar antigens of *E. coli* were demonstrated. The time-
course of the responses to the polysaccharide anc
protein antigens suggested that a secondary respo
to lipolysaccharide was being observed in the se-
cretions. Examination of the autoclaved diet fec
to the germfree animals indicated the presence of
antigenically intact polysaccharide materials (i
lipopolysaccharides), whereas antigenic bacterial
proteins were uniformly undetectable. Therefore
endotoxin in the diet was apparently causing a
primary type of sensitization in the mice, wherea
the active p.o. immunization regimen induced a
secondary antibacterial response in the secretion

4703 REDISTRIBUTION OF CANINE SPLANCHNIC BL
FLOW FOLLOWING NORMOTENSIVE HEMORRHAGE

(Eng.) Kauffman, G. L., Jr.; D'Alecy, L. G. (Uni
Michigan Medical Center, Ann Arbor, MI 48109).
Surg. Res. 22(5):580-584; 1977.

Changes in splanchnic blood blow were studied in
unanesthetized dogs subjected to normotensive her
orrhage to explain the protection of the gastric
antral mucosa from stress-induced ischemic damage
Gastric mucosal, duodenal, and pancreatic blood
flow was measured in 10 dogs using the radioacti
microsphere technique. Twenty percent of the cal
culated blood volume was withdrawn over a 30-min
period in five dogs. Any animal whose mean arter
ial blood pressure fell more than 10 mm Hg follow
hemorrhage was excluded. Following hemorrhage,
significant reduction in blood flow affected the
gastric body mucosa (-62.3%), duodenum (-46.9%),
and pancreas (-63.7%). No significant blood flow
reduction occurred in the gastric antral mucosa.
Mucosal blood flow reduction after hemorrhage was
significantly greater in the cardia (-65%) than
the preantral regions (-59.5%, p=0.047). Gastric
antral blood flow is minimally sensitive to stres
suggesting a basis for the clinical observation
gastric body ulceration with antral sparing.

4704 CHANGES OF UPPER GASTROINTESTINAL BLOO
FLOW AFTER HEMORRHAGE IN RABBITS. (En

Manabe, T.; Suzuki, T.; Honjo, I. (Beth Israel H
and Harvard Medical Sch., 330 Brookline Ave.,
Boston, MA 02215). *Surgery* 81(4):446-452; 1977.

The sequential changes of blood flow patterns in
the esophagus, the lesser and greater curvature
the corpus, the antrum, and the duodenum in expe
mentally induced hemorrhage and blood transfusio
were studied in rabbits. Blood flow was determi
using radioactive microspheres, which were injec
into the left ventricle. Fifteen minutes after
hemorrhage, the cardiac output decreased to 54.1
of control, and the blood flow of the mucosal la
was reduced significantly to 35.4% of the contro
value in the esophagus, 30.5% in the lesser curv
32.9% in the greater curvature, 34.8% in the ant
and 41.9% in the duodenum. The persistent reduc
of mucosal blood flow continued until 60 min aft
hemorrhage. Despite these distribution patterns
mucosal blood flow during hemorrhage, no macrosc
change was seen in any part of the gastrointesti

mucosa. One hour after blood reinfusion, significant increases in mucosal blood flow were found in the lesser curvature (201.9% of the control value), greater curvature (147.5%), esophagus (85.5%), antrum (122.5%), and duodenum (102.9%). In all animals, bleeding erosions about 0.5 cm in diameter had developed in the corpus. Six hours after blood reinfusion, the bleeding from the mucosal foci in the corpus ceased, and the mucosal blood flow returned almost to normal (to 140.7% in the lesser curvature and to 78.1% in the greater curvature). The higher susceptibility of the corpus to hemorrhagic shock may be due to the greater degree of rapid increase of mucosal blood flow occurring in this portion alone after blood transfusion, as well as to its higher vulnerability to ischemia in the hemorrhagic period. The flow patterns in the muscular layer approximately paralleled those in the mucosal layer during hemorrhage and blood transfusion.

4705 SYMPATHETIC NERVOUS CONTROL OF INTRAMURAL BLOOD FLOW IN THE FELINE AND HUMAN INTESTINES. (Eng.) Hulten, L.; Lindhagen, J.; Lundgren, O. (Dept. Surgery II, Univ. Goteborg, Fack, 400 33 Goteborg 33, Sweden). *Gastroenterology* 72(1):41-48; 1977.

The effect of electrical stimulation (8 Hz) of the regional sympathetic vasoconstrictor fibers on total and intramural blood flow in feline and human small and large intestines was studied by an inert-gas-washout technique. The initial response to electrical stimulation in both cat and man was a marked reduction in intestinal blood flow, followed by an increase 3-4 min later. This characteristic flow response, an "autoregulatory escape" phenomenon, levels off at a reduced but steady value around 5 min after the start of stimulation. In the cat, the flow distribution was unchanged. In man, however, vasoconstriction was more pronounced in the muscularis than in the mucosa-submucosa and a larger fraction of the total blood flow was diverted to the mucosa-submucosa. These results are similar to the response patterns observed in the stomach.

4706 STUDIES ON CIRCULATING BLOOD IN ALERT HUMANS AND ANIMALS. II. STUDIES ON MECHANISM OF WATER RESORPTION FROM THE INTESTINE TO THE BLOOD OF THE V. PORTAE IN RATS. (Ger.) Aziz, O.; Sommer, E. (Institut fur Angewandte Physiologie, Philipps-Universitat, Lahnberge, D-3550 Marburg/Lahn, W. Germany). *Res. Exp. Med. (Berl.)* 169(1):45-67; 1976.

The course and volume of intestinal electrolyte concentrations were examined by continuous conductometry of portal venous and aorta blood ultrafiltrates in the rat. Intraduodenal infusion of tap water in rats corresponding to 0.5, 1.0, and 2.0% of body weight led to different reactions in the course and volume of arteriovenous differences (AVD) of electrolytic concentration. The highest AVD (9 mVal/l) was recorded at a water gush of 2.4 ml and a portal flow of 14.5 ml/min, indicating a water flux into the blood of nearly 0.9 ml/min. Permeability changes, for water in the lumen-to-blood and for electrolytes in the blood-to-lumen direction, are considered to be the cause of the above differences. Thirst appears to have an enhancing effect on AVD.

4707 BLOOD FLOW AND OXYGEN CONSUMPTION IN THE FELINE SMALL INTESTINE: RESPONSES TO ARTIFICIAL DISTENSION AND INTESTINAL OBSTRUCTION. (Eng.) Ohman, U. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(4):329-333; 1976.

Relations between blood flow and oxygen consumption were studied in denervated and homologously perfused feline small intestine. Under resting conditions, oxygen uptake was independent of blood flow within rather wide limits, whereas fractional oxygen extraction displayed a highly significant correlation to flow. Upon artificial distension of the bowel, oxygen uptake became a function of blood flow. The results suggest that autoregulation of oxygen uptake may occur. This autoregulation is abolished upon bound distension. The continuing distension of simple intestinal obstruction causes an inability of the bowel wall vasculature to extract and consume the oxygen currently needed, probably a result of disturbed autoregulation of oxygen uptake. An intervening decompression seems to re-establish autoregulation in the obstructed bowel. The results corroborate the previous suggestion that intra-operative decompression of obstructed bowel restores the ability of its capillary circulation to withstand, with retained function, renewed increments of strain and distension.

4708 ONSET OF CELL PROLIFERATION IN THE SHORTENED GUT: GROWTH AFTER SUBTOTAL COLECTOMY. (Eng.) Buchholtz, T. W.; Malamud, D.; Ross, J. S.; Malt, R. A. (Massachusetts General Hosp., Boston, MA 02114). *Surgery* 80(5):601-607; 1976.

Nucleic acid synthesis and morphological changes were studied in the small intestine of colectomized and sham-colectomized Sprague-Dawley rats for 30 days postsurgery. Nucleic acid synthesis dropped during the first 3 postoperative days, but then began to increase to control levels within a week. Compared to sham-colectomized rats, the significant increments in RNA content at 30 days were 22% in the ileum, 20% in the mid-small bowel, and 18% in the jejunum. Increments in DNA content were insignificant in the ileum, 21% in the mid-small bowel, and 12% in the jejunum. However, the absolute increases in RNA and DNA within a length of small intestine from days 3 to 30 postcolectomy were each 90% in the ileum. The morphological changes followed a similar pattern: low villi and shallow crypts appeared during the first week, but higher villi and deeper crypts were observed from the 14th to the 30th day. By the 14th day, cell migration from the crypts to the tips of the villi had increased 56% in the ileum and 28% in the jejunum. It was concluded that subtotal colectomy in the rat stimulates a compensatory effect of increased cell division and nucleic acid synthesis in the small bowel within 2 weeks after the operation.

4709 ILEAL EPITHELIAL CELL MIGRATION AFTER 40% SMALL-BOWEL RESECTION: AUTORADIOGRAPHIC STUDIES IN THE RAT.

(Eng.) McDermott, F. T.; Roudnew, B. (Alfred Hosp., Monash Univ., Melbourne, Australia). *Am. J. Dig. Dis.* 22(7):637-640; 1977.

An autoradiographic investigation with [^{3}H]thymidine of epithelial cell migration 60 days after 40% small bowel resection was carried out in male Sprague-Dawley rats, to examine small bowel adaptation after enterectomy. The mean number of cell positions between the crypt-villus junction and the leading labeled cell 30 hr after injection was increased by 19.4% in the resected group ($p < 0.02$). The mean total number of cells per villus column was increased by 27.8% ($p < 0.002$). Migration rate estimated in cell positions per hour was accelerated by 18.9% ($p < 0.001$) after resection. The 8.1% lengthened life span of villus cells was not statistically significant. The increased number of cells per villus column and unaltered life span of villus cells would facilitate functional adaptation. The causal relationship between the larger villus cell population and accelerated migration after resection and increased crypt cell proliferation is unknown.

4710 ANALYTICAL SUBCELLULAR FRACTIONATION OF JEJUNAL BIOPSY SPECIMENS: METHODOLOGY AND CHARACTERIZATION OF THE ORGANELLES IN NORMAL TISSUE.

(Eng.) Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 51(6):557-574; 1976.

Analytical subcellular fractionation of jejunal biopsy specimens (10 mg wet weight) was done in a single-step procedure by isopycnic centrifugation on a continuous sucrose or sorbitol density gradient with the Beaufay automatic zonal rotor. The supernatant (3.5 ml after centrifugation of the homogenate at 800 x *g* for 10 min) was layered over a 30 ml density gradient from 1.05 to 1.28 resting on a 4 ml cushion of density 1.32 and centrifuged at 35,000 rpm for 35 min. All the principal organelles were characterized by their modal equilibrium densities in sucrose gradients: brush borders (density 1.21), peroxisomes (density 1.18), mitochondria (density 1.16), endoplasmic reticulum (density 1.16), and basal lateral membranes (density 1.12). Three distinct populations of lysosomes with different modal densities and enzyme content were shown. The technique is applicable to the study of the physiology or pathology of any organ amenable to biopsy.

4711 EXPERIMENTAL REPRODUCTION OF HIRSCHSPRUNG'S DISEASE BY ACUTE NEUROTOXIC ARTERIAL PERFUSION.

(Spa.) Martinez-Almoyna, R. C.; Claver, M.; Monereo, G. J. (Clinica Infantil "La Paz," Ciudad Sanitaria de la Seguridad Social "La Paz," Madrid, Spain). *Rev. Clin. Esp.* 140(1):19-27; 1976.

Histological lesions of the intramural plexus were produced in 12 cats by regional arterial perfusion of the colon with a neurotoxin (mercuric chloride) Perfusion of the inferior mesenteric artery was initiated with 20-40 cm^3 Tyrode's solution; Tyrode's solution (6 cm^3) plus 0.02 mg% mercuric chloride were then added, and all veins in the perfused area were closed off for 1 hr. Animals were sacrificed 2 days (group I, 1/12 cases), 2-3 weeks (II, 5/12), 4-5 weeks (III, 3/12), or 17 weeks (IV 3/12) after perfusion. Mortality was 25%: 3 cats died from perforation of the colon, all in group I The perfused zone showed colonic dilatation (maxim 15.4 mm, II) or stenosis (6 mm, IV) and decrease i length (minimum, 11.6 cm, II). No small intestina changes were noted. Neuronal changes in Auerbach Meissner plexa were slight in groups I, III, and I and were most pronounced in II; effects included h ganglionism (2/5), cytoplasmic and nuclear vacuoli tion (5/5), nuclear pinocytosis (5/5), and inflamm tory infiltration (5/5). In group II, only one of three animals showed any such change. The authors note that inconsistencies in the results may be du to poor experimental techniques, induction of insu ficient ischemia in the perfused area allowing neuron recovery, or induction of an insufficient level of hypoxia.

4712 GLYCOSIDE-INDUCED INTESTINAL ISCHEMIA. THERAPEUTIC POSSIBILITIES.

(Ger.) Bro mann, G. F.; Mikosch, H.; Mayer, M. (Chirurgische Universitatsklinik, Hugstetter Strasse 55, D-7800 Freiburg, W. Germany). *Med. Klin.* 71(47):2066-20 1977.

Extracardiac glycoside changes were studied by mechanical ventricular massage with the Anstadt-c in dogs. The decrease in mesenteric arterial circulation following administration of strophant (0.05 mg/kg, i.v.) is explained by the direct ext cardiac effect of the glycoside on vascular smoot muscle. Inhibition of Ca-synergistic effect of t glycoside by verapamil (0.5 mg/kg, i.v.) was independent of time of administration (i.e., befo simultaneously with, or after strophanthin). Car glycosides may play an important role in the path physiology of intestinal infarction.

4713 ROLE OF PANCREATIC PROTEASES IN THE PAT GENESIS OF ISCHEMIC ENTEROPATHY.

(Eng. Bounous, G.; Menard, D.; de Medicis, E. (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Ca ada J1H 5N4). *Gastroenterology* 73(1):102-108; 19

The effect of trypsin, chymotrypsin, and elastase upon the loss of brush border proteins after shor term occlusion of the superior mesenteric artery was studied in Wistar rats, and the effect of the same enzymes upon the loss of mucosal DNA and pro teins after long-term mesenteric ischemia was als investigated. After 45 min of ischemia, total br border proteins and activities of sucrase, γ-glut myltransferase (GGTPase), and leucylnapthylamidas (LNAase) in the small bowel decreased by 58, 66, and 67%, resp. ($p<0.001$); these decreases were not influenced by previous inhibition of trypsin and chymotrypsin in the lumen with Aprotinin. Prior intestinal perfusion reduced this loss to 17% for total brush border proteins and 30, 29, and 30% for the activities of sucrase, GGTPase, and LNAase, resp. The potential effect of elastase was estimated by adding a physiological amount of the enzyme to the lumen after complete intestinal perfusion and before ischemia. Under these conditions, elastase induced a 21% loss of total brush border proteins and a 35, 46, and 37% drop in the activities of sucrase, GGTPase, and LNAase, resp. When ischemia was prolonged to 100 min, previous selective inhibition of trypsin and chymotrypsin in the lumen with Aprotinin minimized its effects on loss of mucosal weight, DNA, and proteins. These biochemical data, consistent with the morphological picture, suggest the following theory: in the initial phase of ischemia, factors within the intestinal lumen, especially elastase, contribute substantially to the loss of brush border proteins. After the disappearance of the brush border, in the advanced phase of ischemia, the protection by trypsin-resistant glycoproteins is lost, hence the underlying structures are accessible to the digestive action of trypsin, chymotrypsin, and elastase present along the intestinal wall and lumen.

4714 THE ACTION OF FOOD AND MICROBIAL FLORA OF THE DIGESTIVE TRACT ON THE INTESTINAL POOL AND FECAL EXCRETION OF BILIARY ACIDS IN THE RAT: COMPARATIVE STUDY OF AXENIC, GNOTOXENIC AND HOLOXENIC RATS. (Fre.) Sacquet, E.; Mejean, C.; Leprince, C.; Riottot, M.; Raibaud, R. (Laboratoire des animaux sans germes du C.N.R.S., C.N.R.Z., 78350, Jouy-en-Josas, France). *Ann. Nutr. Alim.* 30:603-617; 1976.

The effects of different diets and microbial flora of the digestive tract on cecum distension and on the intestinal content and fecal excretion of bile acids (BA) in axenic, holoxenic, and gnotoxenic, rat are presented. The bacteria that did not metabolize BA were given to axenic rats by stomach and rectal tube; fecal BA were separated by chromatography. Of the 73 strains of bacteria and one fungus isolated, 27 bacteria and the fungus did not metabolize BA. These strains reduced cecum distension of axenic rats fed a semisynthetic diet (SN: consisting of 22% casein, 9% corn oil, 4.5% mineral salts, 5% cellulose, 58% corn starch) with or without cholesterol (CL). Only partial cecum reduction was seen in rats given a commercial feed (CF: 21% crude protein, 3.5% fats, 5% cellulose). In axenic rats fed SN without CL, the intestinal BA content was twice as high as that of holoxenic rats but fecal BA excretion was slightly lower. Intestinal BA were also raised in axenic and holoxenic rats given CF plus CL. The small intestinal BA content and fecal excretion were greatest in axenic and holoxenic rats fed CF with CL. A study of the composition of the feces showed that SN without CL caused a slight increase of cholic acid, whereas the proportion of cholic acid was much less in the three groups of rats that received a CL diet. Feces from holoxenic rats given a SN with CL showed few changes. However, holoxenic rats fed CF had marked changes in fecal BA. The results suggest that bacteria of the digestive tract exert a nonspecific action on the fecal excretion and intestinal content of BA by reducing cecum distension in axenic rats.

4715 ANTIGEN DEGRADATION IN HUMAN COLON ECOSYSTEMS: HOST'S ABO BLOOD TYPE INFLUENCES ENTERIC BACTERIAL DEGRADATION OF A CELL SURFACE ANTIGEN ON Escherichia coli 086. (Eng.) Cromwell, C. L.; Hoskins, L. C. (Northpoint Medical Group, Ltd., 2388 N. Lake Drive, Milwaukee, WI). *Gastroenterology* 73(1):37-41; 1977.

To determine whether human enteric bacterial enzymes that degrade the oligosaccharide moieties of gut mucin glycoproteins also degrade related heteroglycan antigens on the cell walls of enteric bacteria, the ability of enzymes in fecal extracts and anaerobic fecal cultures to degrade a cell surface antigen on *Escherichia coli* 086 was studied. This antigen is structurally and immunologically similar to oligosaccharides containing human blood group B antigenic determinant α-D-(1-3)-galactopyranosyl moieties. Enzyme activity in fecal extracts and fecal cultures degraded the B-like antigen from the surface of *E. coli* 086, but degradation was slower than degradation of B antigen from salivary mucin glycoproteins, and the rate varied among individual subjects. One determinant of degradation rate was the host's blood type. Fecal extracts and cultures from four of six blood group B secretors caused 94% or greater loss of B-like antigen from the bacteria in 24 hr, but only one fecal extract and no fecal culture from ten group A or O secretors degraded it this rapidly from the cells. A bacterial B-degrading α-galactosidase is probably responsible for loss of antigen from *E. coli* 086 during incubation with fecal extract since galactose was released concurrently from the cells and added galactose inhibited the loss. These results suggest that: (1) cell surface antigens on enteric bacteria may normally be degraded by bacterial enzymes in the human colon, and (2) bacterial enzyme adaptation to blood group antigens in the host's gut mucins enhances degradation of similar structures on enteric bacteria.

4716 GASTRIC CLEARANCE OF GASTRIN DURING ACID SECRETORY RESPONSES TO VAGAL ACTIVATION AND ITS EFFECT ON PERIPHERAL GASTRIN LEVELS. A STUDY ON ANESTHETIZED CATS. (Eng.) Uvnas-Wallenstein, K.; Uvnas, B. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 97(3):349-356; 1976.

The relationship of peripheral gastrin levels to the amount of gastric secretion was studied in anesthetized cats by electrical stimulation of the vagi. During a series of 15 experiments, peripheral gastrin levels were unchanged or only slightly increased in the presence of a strong secretory response, but peripheral levels were greatly increased when there was only minimal secretion. There was a significant arteriovenous difference in plasma gastrin levels in the corporeal blood during the vagally-stimulated secretory response. This difference might be due to degradation of gastrin in the corpus mucosa, resulting in the lower levels found in the venous blood, or to secretion into the gastric juice. The clearance of gastrin was 104-540 pg/min, large enough to explain the peripheral levels of gastrin observed in the presence or absence of gastric secretion.

4717 FIBRINOLYTIC ACTIVITY OF ADULT RAT LIVER CELLS IN PRIMARY CULTURE AND INHIBITION BY GLUCOCORTICOIDS. (Eng.) Laishes, B. A.; Roberts, E.; Burrowes, C. (Dept. Pathology, Univ. Toronto, Toronto, Ontario, Canada M5S 1A8). *Biochem. Biophys. Res. Commun.* 72(2):462-471; 1976.

The extracellular digestion of fibrin by individual, cultured primary hepatocytes was investigated to correlate morphological changes of viable, non-growing cells with protease secretion and hormonal responsiveness. Liver tissue from adult male Fischer-344 albino rats was digested with collagenase, and suspensions of 10^5 viable cells were plated in Williams E medium in monolayer flasks. Fibrinolytic activity was detected by the appearance of clear plaques in an opaque agar overlayer containing bovine thrombin, bovine fibrinogen, bovine fetal serum, and Williams medium. Fibrinolysis was also quantitated from cell-free supernatants of hepatocytes by their ability to digest ^{125}I-fibrin films. Plaques indicating proteolysis appeared within 3 days, and they were scored for the presence of single cells with rounded or spreading morphology. Single-cell plaques appeared with a frequency of 2.4×10^{-3} per viable cell number, independently of the number of viable cells remaining. All proteolytically active cells were flattened and spread out. Both the occurrence of flattened cells and their proteolytic activities were inhibited almost completely by dexamethasone (10^{-8} to 10^{-6} M) and, to a lesser degree, by hydrocortisone (10^{-4} M). Dexamethasone did not inhibit the actual fibrinolytic reaction. Proteolysis may be intimately related to the morphological changes of normal hepatocytes.

4718 CELL-MEDIATED IMMUNE MODEL OF ULCERATIVE COLITIS [Abstract]. (Eng.) Rabin, B. S.; Rogers, S. J. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Fed. Proc.* 36(3):1075; 1977.

4719 FAILURE TO PRODUCE INFLAMMATORY BOWEL DISEASE IN GERM-FREE RABBITS [Abstract]. (Eng.) Lock, R.; Hawley, P. R.; Coates, M. E.; Rolls, B. A. (Westminster Hosp., London SW1, England). *Eur. Surg. Res.* 9(Suppl. 1):159; 1977.

4720 ACUTE ISCHEMIC LESIONS OF GASTRIC AND DUODENAL MUCOSA DUE TO EXPERIMENTAL INTRAVASCULAR COAGULATION: CONTINUOUS RECORDING OF MUCOSAL OXYGEN TENSION AND HISTOLOGICAL APPEARANCE. (Eng.) Linder, M. M.; Hartel, W.; Lenz, J. (Stadtische Krankenanstalten, 68 Mannheim 1, Postfach 23, W. Germany). *Eur. Surg. Res.* 9(Suppl. 1):151; 1977.

4721 F-461, 3-DIETHYLAMINO-2,2-DIMETHYLPROPYL 5-(P-NITROPHENYL)-2-FUROATE HYDROCHLORID A NEW NON-ANTICHOLINERGIC SPASMOLYTIC AND GASTRIC ACID INHIBITOR. (Eng.) Goldenberg, M. M. (Norwic Pharmacol Co., Div. Morton-Norwich Products, Inc., Norwich, NY 13815). *Arch. Int. Pharmacodyn. Ther.* 222(1):27-39; 1976.

4722 AN EXPERIMENTAL STUDY OF DIFFERENT METH OF RE-ESTABLISHMENT OF BILIARY DIGESTIV CONTINUITY ON NORMAL BILIARY DUCTS WITH A VIEW TO LATER HEPATIC TRANSPLANTATION [Abstract]. (Eng.) Depadt, G.; Laurent, J. C.; Bournoville, M.; Outters, B.; Verhaeghe, M. (Laboratoire de techni chirurgicale et chirurgie experimentale, Pr M. Verhaeghe, Faculte de medecine de Lille, Place de Verdun 59045 Lille Cedex, France). *Eur. Surg. Re* 8(Suppl. 2):104-105; 1976.

4723 THE EFFECT OF THE OCCLUSION OF LIVER LYMPHATICS ON HEPATIC BLOOD FLOW. (Eng Szabo, G.; Jakab, F.; Sugar, I. (Semmelweis Univ. Medical Sch., Mezo Imre Ut 17, H-1430 Budapest, Hungary). *Res. Exp. Med.* 169(1):1-7; 1976.

4724 MORPHOLOGIC ASPECTS OF EXPERIMENTAL ESOPHAGEAL LYE STRICTURES. II. EFFECT OF STEROID HORMONES, BOUGIENAGE, AND INDUCED LATHYRI ON ACUTE LYE BURNS. (Eng.) Butler, C.; Madden, J. W.; Davis, W. M.; Peacock, E. E., Jr. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Surge* 81(4):431-435; 1977.

4725 CHANGES IN THE BLOOD AND IRON METABOLIS IN RATS WITH ALCOHOLIC FATTY LIVERS [Abstract]. (Eng.) Loh, T. T.; Juggi, J. S. (Dept. Physiology, Univ. Malaya, Kuala Lumpur, Malaysia). *Proc. Soc. Exp. Biol. Med.* 150(2):537-540; 1975.

4726 STUDIES ON SMALL INTESTINAL OBSTRUCTION III. CIRCULATORY EFFECTS OF ARTIFICIAL SMALL BOWEL DISTENSION. (Eng.) Ohman, U. (Dept. Surgery, Karolinska Sjukhuset, Stockholm, Sweden) *Acta Chir. Scand.* 141(6):536-544; 1975.

4727 SIGNIFICANCE OF INTESTINAL SYMPATHETIC NERVE ACTIVITY IN EXPERIMENTAL INTESTIN SHOCK [Abstract]. (Eng.) Haglund, U.; Lundgren, (Sahlgren's Hosp., Sweden). *Eur. Surg. Res.* 9(Suppl. 1):14; 1977.

4728 STUDIES ON SMALL INTESTINAL OBSTRUCTION IV. CIRCULATORY EFFECTS OF ARTIFICIAL SMALL BOWEL DISTENSION AFTER OBSTRUCTION. (Eng.) Ohman, U. (Dept. Surgery, Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 141:545-549; 1975.

729 EFFECT OF NOREPINEPHRINE ON GASTRIC WOUND HEALING. (Eng.) Wayne, R.; Mar-
olis, I. B.; Rongone, E. L.; Beegle, R. C. (U.S.
ublic Health Service Hosp., Seattle, WA). *Surg.*
necol. Obstet. 143(5):749-752; 1976.

730 METHYLPREDNISOLONE, LOMOTIL^R AND CHOLESTYRAMINE TREATMENT OF CLINDAMYCIN COLITIS
HAMSTERS [Abstract]. (Eng.) Browne, R.; Silva,
; Fekety, F. R. (Div. Infectious Diseases, Univ.
chigan, Ann Arbor, MI). *Clin. Res.* 25(3):373A;
77.

731 EFFECT OF GRADED REDUCTION OF BLOOD FLOW ON THE METABOLISM OF THE EUTHERMIC PER-
USED RAT LIVER [Abstract]. (Eng.) Lutz, J.;
hulze, H. G. (Physiologisches Institut der Univer-
tat Wurzburg, Rontgenring 9, D-8700 Wurzburg, W.
rmany). *Pfluegers Arch.* 368(Suppl.):R17; 1977.

732 ABNORMALITIES OF LIVER FUNCTION FOLLOWING EXTENSIVE JEJUNO-ILEAL BYPASS AND RESECTION
RATS [Abstract]. (Eng.) Hyland, G.; Stein, T.;
se, L. (Mater M. Hosp., Dublin 7, Ireland). *Eur.*
rg. Res. 8(Suppl. 1):9-10; 1976.

733 ANALYSIS OF CELL CYCLE COMPARTMENTS OF HEPATOCYTES AFTER PARTIAL HEPATECTOMY.
ng.) Rabes, H. M.; Wirsching, R.; Tuczek, H. V.;
eler, G. (Inst. Pathol., Univ. Munich, Thal-
rchner Str. 36, 8 Munich 2, W. Germany). *Cell*
ssue Kinet. 9(6):517-532; 1976.

34 EFFECT OF UREMIA ON PORTAL AND SYSTEMIC BLOOD AMMONIA LEVELS IN NORMAL AND PORTAL-
RICTURED RATS [Abstract]. (Eng.) Imler, M.;
hlienger, J. L. (Laboratoire de Pathologie Interne
Experimentale de la Clinique Medicale B, Stras-
urg, France). *Digestion* 14(5/6):522; 1976.

35 GLUCAGON AND CANINE LIVER BLOOD FLOW DURING ABDOMINAL SURGERY [Abstract].
ng.) Cowan, R. E.; Jackson, B. T.; Thompson, R. P. H. (Gastrointestinal Lab., Rayne Res. Inst., London, England). *Digestion* 14(5/6):503; 1976.

4736 ROLE OF BILIARY DERIVATION IN THE HEPATIC INFECTION. PATHOLOGY AND ANALYTICAL-BACTERIOLOGICAL STUDIES IN THE PIG [Abstract]. (Eng.) Camprodon, R.; Mendoza, C. G.; Arcalis, L.; Ribas, J.; Ribas, Y. D. (Ciudad Sanitaria "Francisco Franco," Dept. Surgery, Experimental Surgery Unit, P° Valle Hebron, s/n° Barcelona, Spain). *Eur. Surg. Res.* 8(Suppl. 2):103-104; 1976.

4737 PROTECTIVE IMMUNITY IN GIARDIASIS: STUDIES IN CONGENITALLY ATHYMIC (NUDE) MICE [Abstract]. (Eng.) Stevens, D. P.; Mahmoud, A. A. F.; Frank, D. M.; Warren, K. S. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *Gastroenterology* 72(5, Part 2):1136; 1977.

4738 Hymenolepis diminuta: MIGRATION, AND THE RAT HOST'S INTESTINAL AND BLOOD PLASMA GLUCOSE LEVELS FOLLOWING DIETARY CARBOHYDRATE INTAKE. (Eng.) Dunkley, L. C.; Mettrick, D. F. (Dept. Microbiology, Univ. West Indies, Kingston, Jamaica, West Indies). *Exp. Parasitol.* 41(1):213-228; 1977.

4739 Nippostrongylus brasiliensis AND Trichinella spiralis: LOCALIZATION OF LYMPHOBLASTS IN THE SMALL INTESTINE OF PARASITIZED RATS. (Eng.) Love, R. J.; Ogilvie, B. M. (Dept. Veterinary Medicine, Univ. Sydney, New South Wales 2006, Australia). *Exp. Parasitol.* 41(1):124-132; 1977.

See also, 4503, 4507, 4545, 4548, 4605, 4609, 4676,
4690, 4697, 4699, 4922, 5116, 5180, 5197.

DIAGNOSTIC PROCEDURES

4740 THE DIAGNOSTIC SIGNIFICANCE OF INTESTINAL METAPLASIA IN ENDOSCOPIC GASTRIC BIOPSIES. (Eng.) Johansen, A.; Sikjar, B. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(2):240-244; 1977.

The incidence of intestinal metaplasia was determined in gastric biopsy specimens from nondiseased areas of stomachs with proven carcinoma or benign lesions. Although intestinal metaplasia was found more frequently among the 315 biopsies from stomachs with carcinoma than among the 786 biopsies from stomachs with benign disease, this difference was not statistically significant. However, 17% of 82 biopsies from stomachs with carcinoma had extensive intestinal metaplasia, while only 7% of 189 biopsies from stomachs with benign lesions had extensive metaplasia ($p<0.05$). Although intestinal metaplasia seems to be associated with stomach carcinoma, this could not be used for diagnostic purposes.

4741 ULTRASOUND IN THE DIAGNOSIS OF IDIOPATHIC HYPERTROPHIC PYLORIC STENOSIS. (Eng.) Teele, R. L.; Smith, E. H. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *N. Engl. J. Med.* 296(20):1149-1150; 1977.

Ultrasound was used in the diagnosis of hypertrophic pyloric stenosis in five babies (aged 5-16 weeks) with vomiting but no palpable tumors. In one patient, the upper gastrointestinal series was typical of idiopathic hypertrophic pyloric stenosis; in one the radiographs were suggestive of this condition; and in three, they were abnormal but not typical. The ultrasonic scans were strikingly similar. Four patients had a mass in the angle formed by the lower portion of the right hepatic lobe and the upper pole of the kidney. A fifth patient had a mass anterior to the spine. In each patient, the mass was round or oval and relatively echolucent, with a central stellate or cleft-like collection of echoes. The average anteroposterior diameter of each mass was 2.3 cm (range 1.8-2.8 cm). Each patient underwent surgery, and in each the diagnosis was confirmed. The ease and safety of ultrasonic examinations make them useful in the diagnosis of idiopathic hypertrophic pyloric stenosis when the tumor is not palpable or when the radiographs are atypical.

4742 AN EVALUATION OF THE DOUBLE CONTRAST BARIUM MEAL (DCBM) AGAINST ENDOSCOPY. (Eng.) Herlinger, H.; Glanville, J. N.; Kreel, L. (St. James' Univ. Hosp., Leeds, England). *Clin. Radiol.* 28(3):307-314; 1977.

The diagnostic accuracy of the double contrast barium meal (DCBM) and of endoscopy were compared in 50 patients. Diagnosis by means of endoscopy was reported to be better than DCBM since the former is backed by histology and cytology, and one is able to make diagnostic use of the color change of the mucosa in certain inflammatory states. The potential accuracy of DCBM was calculated to be 96% of that accorded to fiberendoscopy. DCBM is reported to be somewhat better than endoscopy in the detection of gastric ulcer scars, ulcers hidden by edema and ulcers in the fundal area of the stomach, where as endoscopy was slightly superior in detecting the duodenal lesions, rare lesions of the anterior stom ach wall, and in diagnosis after partial gastrectom Gastrobulbar endoscopy and DCBM were found to be complementary, and the use of both techniques is suggested to achieve maximum diagnostic accuracy.

4743 USE OF BREATH HYDROGEN (H_2) TO QUANTITAT SMALL BOWEL TRANSIT TIME FOLLOWING PARTI GASTRECTOMY. (Eng.) Bond, J. H.; Levitt, M. D. (Veterans Admin. Hosp., 54th St. and 48th Ave. S., Minneapolis, MN 55417). *J. Lab. Clin. Med.* 90(1): 30-36; 1977.

A technique involving the measurement of pulmonary H_2 excretion after the ingestion of lactulose was used to study the relation between small intestina transit time and postgastrectomy diarrhea. Ten postgastrectomy patients with persistent diarrhea had an average small bowel transit time of 35.2 ± 3 min, which was significantly ($p<0.05$) shorter th either that of 10 patients without diarrhea (74.6 ± 5 min) or 40 healthy controls (72.6 ± 5 min). These decreased transit times appeared to be due t rapid gastric emptying rather than to a primary intestinal abnormality, since the transit of lactulose instilled directly into the jejunum was equally rapid in patients and controls. All postgastrectomy patients with diarrhea failed to absor a portion of a 100-g dose of glucose (quantitated by pulmonary H_2 measurements), but all patients without diarrhea and 10 healthy control subjects absorbed the entire dose. Constant perfusion studies of the terminal ileum in two patients indicat that glucose absorption was least efficient from the most rapidly moving front of the ingested bolu of glucose. These studies suggest that the diarrh observed in some postgastrectomy patients is, in part, the result of malabsorption of carbohydrate due to excessively rapid small bowel transit that is secondary to rapid gastric emptying.

4744 POSITIVE SKIN REACTIONS TO GLUTEN IN COE IAC DISEASE. (Eng.) Baker, P. G.; Read A. E. (Univ. Bristol, Bristol, England). *Q. J. Me* 45(180):603-610; 1976.

Following intradermal challenge with a peptic-tryp digest of gluten dissolved in sterile water (1 g% centration), visible Arthus-type skin reactions we observed in 33% of 55 adults with celiac disease. The patients were either untreated or treated by a gluten-free diet. The amount of gluten intake amo these patients ranged from none to more than 2 g daily. Of 23 patients with untreated disease, pos tive skin reactions occurred in 52%. The skin rea tions to gluten took the form of induration and e thema appearing 2-3 hr after intradermal challenge, becoming maximal at 5-8 hr, and fading over the ensuing 12-18 hr. When skin biopsies obtained from 2 normal controls and from 16 celiac patients displaying positive or negative skin re-

ponses to gluten were compared 5-8 hr after
ntigen challenge, marked polymorph infiltration
atients with negative skin reactions nor in the two
ontrol subjects. When skin biopsies from 14 celiac
atients and from 2 control subjects were treated
ith fluorescein-conjugated anti-human Ig and anti-C_3
omplement to see whether skin challenge sites con-
ained Ig or complement deposits, 8 of the celiac
atients were positive for both anti-Ig and anti-C_3
omplement; the remaining 6 celiac patients and the
control subjects were negative for both tests. All
f the celiac patients positive for these two tests
ad previously shown positive skin reactions and
arked polymorph infiltrate in skin biopsies. Since
o false positive skin reactions were observed among
2 normal controls, skin testing with gluten may
rovide a useful adjunct to the diagnosis and man-
gement of celiac disease, especially on an outpatient
asis.

745 THE PLAIN ABDOMINAL RADIOGRAPH IN PNEUMATOSIS COLI.

(Eng.) O'Connell, D. J.;
ewbury, K. C.; Green, B.; Wyatt, A. P. (Univ. Coll.
osp., London, England). *Clin. Radiol.* 27(4):563-
8; 1976.

inical features and plain film findings in 14
tients with pneumatosis cystoides intestinalis
ere studied over a 3-month to 2-yr follow-up period
determine whether plain film x-ray provides a
liable method for following the clinical course
the disease in response to 5-8 days of treatment
th high concentrations of oxygen. Plain films
ere evaluated by comparison with barium enema
diographs taken before and after treatment. The
aracteristic plain film appearance is a collection
rounded transradiancies projected from the bowel
ll or into the bowel lumen. Cysts smaller than
5 cm were sometimes difficult to distinguish
om gas within the feces, and it is possible to
stake large cysts for normal colonic haustra;
wever, cysts between 0.5 and 4.0 cm in diameter
ere readily identified because the cyst wall
sts a thin dense rim that can be seen against
e background of normal colonic gas and feces.
e thickness of the cyst wall was between 0.5
d 2.0 mm in all cases. Six of 14 patients had
idence of chronic airway obstruction; a pos-
ble cause of pneumatosis coli. The most fre-
ent symptoms presented by the patients were
ndy diarrhea and mucus discharge; symptoms
ere frequently long-standing and intermittent.
tients with diarrhea and nonspecific abdominal
mptoms should have a plain abdominal radiograph
ven though pneumatosis coli is an unusual
planation for these findings) because the plain
lms can be diagnostic. These studies indicate
at the plain abdominal radiograph is also a
mple and reliable method of following the response
patients to treatment.

746 NUCLEAR IMAGING, TOMOGRAPHIC NUCLEAR IMAGING, AND GRAY SCALE ULTRASOUND IN THE
ALUATION OF THE PORTA HEPATIS.

(Eng.) Sample,
F.; Gray, R. K.; Poe, N. D.; Graham, L. S.;
Bennett, L. R. (Center Health Sciences, Los Angeles, CA 90024). *Radiology* 122(3):773-779; 1977.

Twenty-six patients with an equivocal portal defect on conventional nuclear images were evaluated with a multiplane tomographic nuclear scanner and gray scale ultrasound. Of the 17 proved normal cases, 15 were correctly interpreted as normal from the multiplane tomographic nuclear scans, and all 17 were interpreted as normal from the gray scale sonograms. The nine cases that proved to have abnormalities in the portal region were correctly interpreted as abnormal on the multiplane tomographic nuclear scans. The gray scale sonograms were interpreted as abnormal in all nine of the proved abnormal patients. A more specific characterization of the abnormality was usually provided by this technique. Four abnormalities were related to intrahepatic or portal node metastases; one abnormality was related to the extrinsic pressure from a carcinoma of the pancreas; and four were related to a dilated biliary system secondary either to choledocholithiasis, retroperitoneal nodal metastases, or primary carcinoma of the pancreas. The results suggest that these two techniques may be used in a diagnostic sequence for evaluating porta hepatis defects.

4747 COMPARATIVE DIAGNOSTIC VALUE OF GAMMA SCAN, ECHOTOMOGRAPHY AND SPLENOPORTOGRAPHY AND ARTERIOGRAPHY IN HYDATIDOSIS OF THE LIVER. ANALYSIS OF 170 SURGICALLY CONFIRMED CASES.

(Spa.) Cano, J. M.; Perez-Jimenez, F.; de Dios, J. F.; Perez-Carnero, A.; Muro, J. (Departamento de Medicina Interna, Ciudad Sanitaria de la Seguridad Social, "La Paz," Madrid, Spain). *Rev. Clin. Esp.* 140(1):29-42; 1976.

The relative effectiveness of diagnostic techniques in cases of suspected hepatic hydatidosis was examined in a review of 170 cases in which surgical confirmation was available. Laparoscopy was of little value because only one section of the liver surface was accessible. Splenoportography was considered inadequate because the information is also available from arteriography at less risk to the patient. Although a negative tomoechographic study did not exclude the possibility of hydatidosis, a positive result was a reliable indicator of the disease. Given the relative simplicity of this method, it was recommended particularly for use prior to more invasive techniques. Gammagraphy supplied a higher percentage of correct diagnoses of hepatic masses than other methods, especially in masses of the left hepatic lobe. However, this method gave no indication of the nature of the mass (benign or malignant). Arteriography was not as effective as gammagraphy in locating lesions of the left lobe, yet it remained the most effective and complete overall exploratory technique in hydatidosis diagnosis.

4748 A COMPARATIVE STUDY OF OPERATIVE MANOMETRY AND CHOLANGIOGRAPHY.

(Spa.) Suarez Savio, O.; Kin, L. C.; Rodriguez, L. V.; Gonzalez, B. N.;

Rael, A. A.; Mena, R. V. (Instituto de Nefrologia, Hospital docente clinicoquirurgico "Joaquin Albarran," Ave. 26 y R. Boyeros, Cerro, La Habana, Cuba). *Rev. Cubana Cir.* 14(4):363-366; 1975.

Radiomanometry is a simple technique that permits simultaneous monitoring of radiology and manometry of the biliary tract during surgery. This technique was used in 130 patients (122 women, 8 men; average, 45.1 yr) who had biliary tract operations. Preoperative diagnosis was confirmed in 112/130 patients; 17/130 were diagnosed during surgery, 11/17 by radiomanometry, and 6/17 by cholangiography. Because manual injection of the contrast medium, as in cholangiography, produces a high intraductal pressure, obstacles produced by sphincter lesions or small calculi were sometimes undetectable. Radiomanometry, which involves a lower intraductal pressure, was superior to cholangiography for detecting biliary tract lesions.

4749 DIFFERENTIAL DIAGNOSIS OF LIVER DISEASE BY SONOGRAPHY: CORRELATION WITH SCINTIGRAPHY AND ANGIOGRAPHY. (Ger.) Mayrhofer, H. P.; Czembirek, H.; Imhof, H.; Nowotny, Ch.; Pokieser, H. (I. Medizinische Universitatsklinik Wien/Roentgen, Lazarettgasse 14, A-1097 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(13):442-447; 1977.

The diagnostic value of sonography was studied in 44 patients with diffuse hepatic processes and in 58 patients with circumscribed processes. The diffuse processes included liver cirrhosis in 37 cases and lymphogranuloma, fibrosis, hepatomegaly due to polycythemia, immunopathy, and osteomyelosclerosis in 7. The ultrasonic findings were positive in 36 cases, negative in 1, and doubtful in 7. For liver cirrhosis, the findings were positive in 29/37 cases, negative in 1, and doubtful in 7. The distribution of the scintigraphic findings in all 44 patients was exactly the same. Angiography was performed in 17 of these patients; the finding was positive in 12 cases, negative in 1, and doubtful in 4. The circumscribed processes included multiple metastases in 37 patients, multiple hepatic cysts in 4, multiple reticulosarcomas in 1, primary liver carcinoma in 14, abscess in 1, and adenoma in 1. The sonographic findings were positive in 46/58 cases, negative in 11, and doubtful in 1. The scintigraphic findings were positive in 45/58 cases and negative in 6. Sonography was the only method that differentiated between solid and cystic processes. Its main field of application lies in the diagnosis of circumscribed processes. Diffuse processes without clearly defined acoustic borders can be differentiated only on the basis of additional clinical data. The combined use of sonography, scintigraphy, and angiography produces a correct diagnosis in nearly 90% of all cases.

4750 ACTIVITY OF 5' NUCLEOTIDASE IN THE SERUM OF CHILDREN WITH HEPATIC PATHOLOGY. (Fre.) Stephant, E.; Cret, L.; Lahet, C.; Bienvenu, J.; Vial, P.; Mathieu, M. (hopital Debrousse, F 69322 Lyon Cedex 1, France). *Pediatrie* 31(8):771-785; 1976.

Serum enzyme activities were determined in 96 heal neonates and infants and compared to that of infan with viral hepatitis (9), cholestatic icterus (9), or other disorders with secondary hepatic involvement. Enzymic activities measured included 5-nucleotidase (5-NU), aspartate aminotransferase (TGO) alanine aminotransferase (TGP), and alkaline phosphatase (PAL). Three age categories were tested: 0-1 months (11), 1 month-2 yr (17), and 2-14 yr (Kinetic UV was used to determine TGO, TGP, and 5- activities, whereas PAL was measured by the modifi method of Morgenstern with the Technicon SMA 12 micromethod. A constant significant elevation in the activities of TGO, TGP, 5-NU, and PAL was observed in patients with viral hepatitis. The correlation between 5-NU and PAL was statistically significant in viral hepatitis, atresia of the biliary extrahepatic ducts, and in cases of alpha- antitrypsin deficiency. No correlation between T and TGP was noted. In hematological disorders (anemia, metastatic sympathoblastoma, lymphosarco and hepatocarcinoma), 5-NU was always normal whil the transaminase activities varied. A disagreeme between 5-NU and PAL was noted 3 times in metaboli diseases (glycogenesis, 5; intolerance to fructos 2) while the elevation of transaminases attested to a hepatic infection without finding an explanation for this. An increase in transaminases occurred in a 9-month-old infant due to hepatotoxic induced by cyclophosphamide and vincristine. Hep totoxicity in three patients receiving rifampicin or asparaginase could not be definitely attribute to these drugs.

4751 LEVELS OF IMMUNOREACTIVE GLYCINE-CONJUG BILE ACIDS IN HEALTH AND HEPATOBILIARY DISEASE. (Eng.) Demers, L. M.; Hepner, G. W. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Am. J. Clin. Pathol.* 66(5):831-839; 1976.

A sensitive radioimmunoassay for cholylglycine, chenodeoxycholylglycine, deoxycholylglycine, and sulfolithocholylglycine was established using ant bodies obtained from rabbits injected with albumi conjugates of these bile acids. This technique was used in the analysis of sera from 25 controls and 100 patients with hepatic disease (alcoholic cirrhosis, hepatitis, cholestasis, and hepatic malignancy). Cholylglycine levels were significantly elevated in most patients and in all hepat biliary disease groups. The increases were simil in all groups, extending to several hundred μmol/ in several patients with malignancy, the elevatio reached <1,000 μmol/1. Chenodeoxycholylglycine w increased predominantly in cholestasis, but not t great an extent as with cholylglycine. This bile was also elevated slightly in the sera of about half the patients with hepatitis and hepatic mali nancy, but in only 5/32 patients with cirrhosis. Deoxycholylglycine was increased mostly in cirrhosis, and only about half the patients in the remaining groups had elevated levels. Sulfoithocholylglycine was elevated in all patients ith hepatobiliary disease. The serum levels of henodeoxycholylglycine, cholylglycine, and sulfoithocholylglycine were measured in one volunteer or 24 hr after the ingestion of 1 g of chenodeoxyholic acid. The cholylglycine level did not hange significantly during the first 3 hr after ngestion, but then rose in response to the ingestion f a meal; this level was within normal limits 5 hr fter the meal. Chenodeoxycholylglycine increased ontinuously 1.5 hr after chenodeoxycholic acid ngestion, reaching a level six times higher than he fasting level until 8 hr after bile acid ngestion; 24 hr later, the level was still signiicantly higher than the fasting level. Sulfoithocholylglycine remained unchanged for the first hr and then increased to twice the fasting level t 24 hr. The results suggest that serum bile cids, particularly sulfolithocholylglycine, are highly sensitive index for hepatic dysfunction.

752 THE USE OF CERULEIN, A NEW GALLBLADDER STIMULATING AGENT, IN THE RADIOLOGICAL XAMINATION OF THE BILE DUCTS. (Spa.) Mosca, L. .; Brasseur, O.; Mosca, L. E. (Laprida 138, Parana, . Rios, Rca, Argentina). *Prensa Med. Argent.* 62(4): 3-87; 1975.

erulein, a decapeptide isolated from frog skin *Hyla cerulea),* is a powerful stimulant of gallladder contraction and evacuation, intestinal eristalsis, pancreatic secretion, and gastric seretion. It has proven superior to the Boyden meal n stimulating biliary motility for cholecystography. erulein acts directly on the gallbladder, whereas he Boyden meal acts by hormonal mediation through he digestive system. Cerulein induces a more inense contraction than the Boyden meal. Administered arenterally, the exact dose of the stimulant is nown and relates predictably to contraction intenity. The period between administration and conraction is short (10 min with 40 mg cerulein), nd 100% of the biliary ducts contract, at some oint during the the test, indicating that none of hese ducts is "atonic" as previously supposed. he authors are confident that cerulein will replace he Boyden meal in the cholecystographic study of allbladder evacuation.

753 THE ROLE OF RADIONUCLIDE IMAGING IN DISEASE OF THE ALIMENTARY TRACT. (Eng.) reeman, L. M.; Rosenthall, L. (Montefiore Hosp. nd Medical Center, 111 East 210th St., Bronx, NY 0467). *Gastrointest. Radiol.* 1(2):187-196; 1976.

754 FIBEROPTIC GASTROINTESTINAL ENDOSCOPY IN THE AGED. (Eng.) Manier, J. W. (Marshield Clinic, 1000 North Oak Ave., Marshfield, WI 4449). *Gastrointest. Endosc.* 23(3):155-156; 1977.

755 FIBERENDOSCOPY OF THE GASTROINTESTINAL TRACT IN CHILDREN. A SERIES OF 100 XAMINATIONS. (Eng.) Cadranel, S.; Rodesch, P.; Peeters, J. P.; Cremer, M. (Hopital Universitaire St. Pierre, Rue Haute, 322, 1000 Bruxelles, Belgium). *Am. J. Dis. Child.* 131(1):41-45; 1977.

4756 CAN EMERGENCY ENDOSCOPY INFLUENCE INDICATIONS IN ACUTE UPPER GASTROINTESTINAL BLEEDING [Abstract]? (Eng.) Rohde, H.; Troidl, H.; Fischer, M.; Vestweber, K. H.; Lorenz, W. (Surgical Clinic, Univ. Marburg, 3550 Marburg, Robert-Koch-Strasse, Marburg, W. Germany). *Endoscopy* 9(2): 114; 1977.

4757 PROSPECTIVE COMPARISON OF DOUBLE-CONTRAST BARIUM MEAL EXAMINATION AND FIBREOPTIC ENDOSCOPY IN ACUTE UPPER GASTROINTESTINAL HAEMORRHAGE. (Eng.) Stevenson, G. W.; Cox, R. R.; Roberts, C. J. C. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *Br. Med. J.* 2(6038): 723-724; 1976.

4758 ARTERIAL BLOOD GAS TENSIONS DURING UPPER GASTROINTESTINAL ENDOSCOPY. (Eng.) Whorwell, P. J.; Smith, C. L.; Foster, K. J. (Southampton General Hosp., Tremona Rd., Southampton SO9 4XY, England). *Gut* 17(10):797-800; 1976.

4759 ESOPHAGOSCOPY UNDER ANESTHESIA IN CONDITIONS OF DIFFUSE VENTILATION. (Rus.) Skvortsov, M. B.; Khlystov, V. N. (Dept. Surgery, Irkutsk Medical Inst. in Oblast Clinical Hosp., Irkutsk, USSR). *Vestn. Khir.* 117(10):97-98; 1976.

4760 COMPLICATIONS IN ENDOSCOPIC STUDIES OF THE ESOPHAGUS AND STOMACH. (Rus.) Inshakov, L. N.; Vorontsov, I. I.; Dzhumashev, E. Z.; Ismailova, A. A. (Kazakh Scientific Res. Inst. Oncology and Radiology, Alma-Ata, USSR). *Klin. Med. (Mosk.)* 54(10):46-50; 1976.

4761 THE INCIDENCE AND RESULT OF RADIOLOGICAL EXAMINATION OF THE STOMACH USING A BARIUM MEAL. (Eng.) Bonnevie, O. (Hvidovre Hosp., 2650 Hvidovre, Denmark). *Scand. J. Gastroenterol.* 11(8): 839-847; 1976.

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[Abstract]. (Eng.) Heinkelmann, W.; Petrowicz, O.; Duspiva, W.; Blumel, G. (Inst. Experimental Surgical Technology, Univ. Munich Ismaningerstr. 22, Munich, W. Germany). *Eur. Surg. Res.* 8(Suppl. 1):4-5; 1976.

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4766 BARIUM OPACIFICATION OF THE COLON AT LOW PRESSURE AND CONTROLLED FLOW [Letter to Editor]. (Fre.) Levy, E.; Rouger, Ph.; Chalut, J.; Loygue, J. (Hopital Saint Antoine, 184 faubourg Saint Antoine, F 75012 Paris, France). *Nouv. Presse Med.* 5(39):2639; 1976.

4767 RECOMMENDATIONS FOR STANDARDIZATION OF RETROGRADE X-RAY CONTRAST DEMONSTRATION OF THE COLON. BASIC PROGRAM. (Ger.) Dalicho, W.; Kroger, W.; Leyda, H.; Reisinger, W.; Richter, K.; Sharif, J.; *et al.* (I. Medizinischen Klinik und Poliklinik des Bereichs Medizin [Charite] der Humboldt-Universitat, DDR-104 Berlin, Schumannstr. 20/21, E. Germany). *Gesundheitsw.* 31(45): 2121-2123; 1976.

4768 POSSIBLE AND NECESSARY IMPROVEMENTS OF RETROGRADE X-RAY EXAMINATION OF THE COLON. DOUBLE-CONTRAST TECHNIQUE AS A BASIC METHOD. (Ger.) Richter, K.; Sharif, J.; Reisinger, W. (I. Medizinischen Klinik und Poliklinik des Bereichs Medizin der Humboldt Universitat, DDR-104 Berlin, Schumannstr. 20/21, E. Germany). *Dtsch. Gesundheitsw.* 31(45): 2113-2120; 1976.

4769 LAPAROSCOPY AND ITS POSSIBILITIES IN THE CYTODIAGNOSIS OF ABDOMINAL CANCER. (Spa.) Marti Vicente, A.; Cabre Fiol, V.; Martin Zarate, J. M.; Carrilho, F. J.; Vilardell, F. (Escuela Profesional de Patologia Digestiva del Hospital de la Santa Cruz y San Pablo, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(3):271-280; 1976.

4770 ABDOMINAL THERMOGRAPHY IN INFANTILE AND CHILDHOOD LIVER DISEASE. (Eng.) Bhatia, M.; Poley, R.; Haberman, J. D.; Boon, D. J. (Univ. Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190). *South. Med. J.* 69(8): 1045-1048; 1976.

4771 LIVER AND GALL-BLADDER IMAGING WITH TECHNETIUM-99m DIHYDROTHIOCTIC ACID AND TECHNETIUM-99m PYRIDOXYLIDENE GLUTAMATE--A STUDY IN THE YOUNG PIG. (Eng.) Jenner, R. E.; Clarke, M. B.; Howard, E. R. (King's Coll. Hosp., Medical Sch., London SE5 8RX, England). *Br. J. Radiol.* 49(586):852-857; 1976.

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4775 ENDOSCOPIC RETROGRADE CANNULATION OF THE ACCESSORY AMPULLA. (Eng.) Elmore, M. F. Lehman, G. A.; Meadows, J. R. (Indiana Univ. Medica Center, 1100 West Michigan St., Indianapolis, IN 46202). *Gastrointest. Endosc.* 23(3):170; 1977.

4776 HEPATIC PUNCTURE BIOPSY BY THE TRANSJUGUL PATHWAY. (Fre.) Lebrec, D.; Buysschaert M.; Degott, C.; Rueff, B.; Benhamou, J. P. (Hopital Beaujon, 100 bd du General Leclerc, F 92110 Clichy, France). *Nouv. Presse Med.* 5(33):2135-2137; 1976.

4777 CARCINOEMBRYONIC ANTIGEN AND THE LIVER. (Eng.) Loewenstein, M. S.; Zamcheck, N. (Boston City Hosp., Boston, MA 02118). *Gastroenterology* 72(1):161-166; 1977.

4778 CHARACTERISTICS AND BEHAVIOUR OF ARYLESTERASE IN HUMAN SERUM AND LIVER. (Eng. Burlina, A.; Michielin, E.; Galzigna, L. (General Hosp. Conegliano, Italy). *Eur. J. Clin. Invest.* 7(1):17-20; 1977.

4779 DIAGNOSTIC AND DIFFERENTIAL-DIAGNOSTIC SIGNIFICANCE OF DETECTION OF HEPATITIS ANTIGEN B IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Tsybulyak, S. N. (Kishinev Medical Inst., Kishinev, USSR). *Pediatriia* (7):19-21; 1976.

4780 DIAGNOSTIC SIGNIFICANCE OF DETERMINATION OF THE ACTIVITY OF HISTIDASE IN THE BLOO SERUM IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Akhmadzhanov, U. (Dept. Infectious Childhood Diseases, Central Asian Inst. Pediatrics, USSR). *Pediatriia* (7):27-28; 1976.

781 TRANSIENT ANTIBODIES TO DNA POLYMERASE IN ACUTE HEPATITIS B AND RELATED DISEASES. Eng.) Cappel, R.; Desmyter, J.; Badburne, A. F.; hiry, L. (Institut Pasteur of Brussels, Rue du emorqueur 28, 1040 Brussels, Belgium). *Biomedicine Express]* 25(6):209-211; 1976.

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784 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH HYPOTONIC DUODENOGRAPHY FOR THE IAGNOSIS OF JAUNDICE. (Fre.) Yoshitomi, G. Hopital Central, Kurashiki, Japan). *Lyon Chir.* 2(5):305-308; 1976.

785 ENDOSCOPIC CHOLANGIOPANCREATICOGRAPHY: METHODOLOGICAL AND ENDOSCOPIC ASPECTS. Fre.) Archambault, A.; Giroux, Y.; Farley, A. (Hopital Maisonneuve-Rosemont, 5415, boulevard de l'Assomption, Montreal HIT 2M4, Canada). *Rev. Fr. Gastroenterol.* 121(7):13-20; 1976.

4786 PRELIMINARY RESULTS AND DIAGNOSTIC VALUE OF ENDOSCOPIC CHOLANGIOPANCREATICOGRAPHY AT MAISONNEUVE-ROSEMONT HOSPITAL. (Fre.) Archambault, A.; Giroux, Y.; Bourgie, J.; Bessette, G. (Hopital Maisonneuve-Rosemont, 5415, boulevard de l'Assomption, Montreal HIT 2M4, Canada). *Rev. Fr. Gastroenterol.* 121(7):33-43; 1976.

4787 AMYLASE CREATININE CLEARANCE RATIO IN ACUTE PANCREATITIS [Abstract]. (Eng.) Murray, W. R.; MacKay, C. (Western Infirmary, Glasgow, Scotland). *Eur. Surg. Res.* 8(Suppl. 1): 71; 1976.

See also, 4484, 4511, 4612, 4788, 4792, 4803, 4806, 4807, 4814, 4817, 4825, 4854, 4861, 4864, 4870, 4872, 4873, 4879, 4883, 4885, 4902, 4916, 4925, 4929, 4930, 4940, 4943, 4957, 4958, 4976, 4980, 4981, 4985, 4989, 4991, 4996, 4997, 5008, 5011, 5012, 5013, 5017, 5030, 5045, 5050, 5052, 5071, 5129, 5149, 5154, 5155, 5156, 5157, 5158, 5163, 5165, 5166, 5174, 5179, 5210, 5260.

GASTROINTESTINAL DISEASES

ESOPHAGUS

4788 THE SIGNIFICANCE OF AN AIR OESOPHAGOGRAM VISUALIZED ON CONVENTIONAL CHEST RADIOGRAPHS. (Eng.) House, A. J. S.; Griffiths, G. J. (Univ. Rochester, Medical Center, Rochester, NY 14642). *Clin. Radiol.* 28(3):301-305; 1977.

The chest radiograph of 29 patients with achalasia and of 24 patients with scleroderma with esophageal involvement were examined for outlining of the entire esophagus (air esophagogram). Three patients (12.5%) with scleroderma showed an air esophagogram. In two cases, there were well-defined, mainly lower zone, pulmonary fibrotic changes, and the air column was seen only on the lateral film. The air esophagogram in the third patient was accentuated with the development of cardiac failure and bilateral pleural effusions. The esophageal caliber was either normal or mildly dilated, and air was present in the gastric fundus. The disease was advanced before the esophageal air was demonstrated. Three patients (10%) with achalasia had an air esophagogram, which was a temporary phenomenon seen only on one examination. The air column was visualized on a well-penetrated postero-anterior film in one patient; it was not shown on the postero-anterior film of another patient but was seen on a right anterior oblique film obtained at the same time. The third patient was in cardiac failure, and the esophageal air was seen only on the lateral film. All three patients gave a few months history of mild dysphagia, the esophagus was mildly dilated without an air fluid level, and there was air in the fundus. Seventy-nine percent of the 29 patients with achalasia and 8% of the 24 patients with scleroderma had constant absence of air in the fundus. The air-filled esophagus has not been previously reported in achalasia; since it is an early manifestation of the disease, it is clinically important.

4789 LOWER ESOPHAGEAL SPHINCTER PRESSURES AND SERUM GASTRIN LEVELS AFTER CHOLINERGIC STIMULATION. (Eng.) Higgs, R. H.; Humphries, T. J.; Castell, D. O.; McGuigan, J. E. (Naval Regional Medical Center, Philadelphia, PA 19145). *Am. J. Physiol.* 231(4):1250-1253; 1976.

The effect of serum gastrin on the response of the lower esophageal sphincter (LES) to bethanechol, a cholinergic agent, was determined by measuring serum gastrin levels and LES pressure in normal controls, in patients with vagotomy and antrectomy (V&A), and in patients with vagotomy and pyloroplasty (V&P). Mean basal LES pressures in the patients and controls were not significantly different. However, compared to controls, the mean basal serum gastrin level in V&P patients was significantly higher ($p< 0.05$), while the level in V&A patients was significantly lower ($p<0.05$). Bethanechol was administered to all subjects, s.c., after an overnight fast, in doses of 0.01, 0.02, 0.04, and 0.08 mg/kg. In controls, 0.08 mg/kg bethanechol produced a significant increase in LES pressure ($p<0.05$), but no change in serum gastrin level. The three higher doses increased LES pressure to a greater extent in V&P patients than in V&A patients ($p<0.05$). Serum gastrin levels did not change in either group; however, background serum gastrin concentrations were significantly greater for V&P patients than V&A patients throughout the study. I.v. infusion of human gastrin I heptadecapeptide (0.06 µg/kg/hr) in controls resulted in a significant increase in LES response to bethanechol ($p<0.01$). The results indicate that higher background serum gastrin level increase the effect of bethanechol upon LES pressure, but they do not markedly influence basal LES pressure.

4790 MOTOR FUNCTION OF THE ESOPHAGUS AFTER REPAIR OF ESOPHAGEAL ATRESIA AND TRACHEO-ESOPHAGEAL FISTULA. (Eng.) Duranceau, A.; Fisher, S. R.; Flye, M. W.; Jones, R. S.; Postlethwait, R. W.; Sealy, W. C. (Hopital Hotel-Dieu de Montreal 3840, Rue St-Urbain Montreal, Quebec H2W 1T8, Canada). *Surgery* 82(1):116-123; 1977.

The nature and etiology of esophageal motor abnorm ties were studied in 11 patients with previous eso geal atresia repair (TEF) and in 10 normal subject (controls). The upper esophageal sphincters (UES) the two groups did not differ in resting pressure, contraction pressure, or coordination. UES relaxation was 100% in the controls and 83% ± 8% in the patients ($p<0.05$). In the proximal esophagus, 100% of the TEF group showed a normal peristaltic wave, coupled with an abnormal nonperistaltic wave. The controls did not show this type of contraction. In the middle esophagus, the mean peak pressure was 30.5 ± 2.0 mm Hg in controls and 14.6 ± 1.0 in the TEF group ($p<0.001$). Coordination was observed in 97 ± 1% of the controls, but in only 27 ± 4% of the patients ($p<0.001$). In the distal 10 cm of esophagus, peak contraction pressures were 43.3 ± 1.6 mm Hg in controls and 21.3 ± 1.1 in the TEF group ($p<0.001$). Coordination was 94 ± 1% in normal subjects and 66 ± 4% in the patients ($p<0.001$). The resting pressure in the patients was significantly higher at all three esophageal levels (proximal, mid, distal) than in controls. In both groups, lower esophageal sphincter function did not show any significant difference except for closing pressure, which was significantly higher in controls (39.9 ± 6.8 mm Hg) than in the TEF groups (21.3 ± 3.0 mm Hg, $p<0.02$). These studies suggest that marked motility abnormalities occur in the repaired esophagus after atresia. These abnormalities are distinctly different from other motor disorders of the esophagus.

4791 TREATMENT OF CORROSIVE BURNS OF THE ESOPHAGUS. (Eng.) Campbell, G. S.; Burnett, H. F.; Ransom, J. M.; Williams, G. D.

4301 W. Markham St., Little Rock, AR 72201). *Arch.*
urg. 112(4):495-500; 1977.

he treatment of 40 patients with caustic ingestion
een over a 20-yr period is reviewed. The median
ge of the patients was 3 yr, and 80% of the
atients were less than 10 yr of age. Strong alkali
as the corrosive in 95% of the cases. The initial
anagement in 18 patients consisted of observation
nly; stricture subsequently developed in 15 of these.
our patients were initially treated with cortico-
teroids alone; all remained free of stricture. One
f 2 patients initially treated with antibiotics
lone developed stricture, and 2 of 14 patients
nitially treated with corticosteroids and anti-
iotics developed stricture. Esophageal bougienage
estored an adequate lumen in 2 patients with short,
oft annular strictures, and right colon interposi-
ion was used for esophageal substitution in 10
atients who had long, dense strictures. This
rocedure produced good results in eight patients
nd fair results in one; in the remaining patient
ith poor results, sloughed colon interposition
ccurred. Early diagnostic esophagoscopy, to the
ppermost level of burn injury only, is recommended
o determine the presence and severity of the
sophageal injury. If esophagoscopy reveals
sophageal burn injury, corticosteroid and anti-
iotic therapy should be continued. If no burn
njury is visualized, the patient is spared unneces-
ary treatment. Long, dense strictures unresponsive
o bougienage place the patient at risk from
nstrumental perforation, and these patients should
ndergo colon interposition through a substernal
xtrapleural tunnel.

792 DIAGNOSTIC DIFFICULTIES IN CARCINOMA OF OESOPHAGUS.

(Eng.) Dasgupta, G.; Das,
P. B. (Miraj Medical Center, Maharashtra,
ndia). *Indian J. Cancer* 13(4):310-313; 1976.

he cases of six patients in whom biopsy failed to
emonstrate surgically proven carcinoma are pre-
ented. These patients were among 219 patients
ndergoing diagnostic esophagoscopy, 39 of whom had
o surgically-proven or biopsy-proven malignancy.
he six patients in whom a false-negative diag-
osis was made had esophageal lesions detected by
oth radiology and esophagoscopy. One reason for
he false-negative biopsy was that an endophytic
rowth from the outer part of the luminal epithelium
ave rise to a lesion discernable by endoscopy but
ith an intact mucosal surface. An esophageal con-
triction resulting from subepithelial spread of the
arcinoma beneath an intact mucosa may give a false
mpression of a tumor; the biopsy taken from this
dematous area will give negative results. A
hird explanation for the false-negative results in
hese patients was that the lesion occurred at the
ardio-esophageal junction; this would result in a
egative biopsy from a blind area of the stomach.

793 APERISTALSIS AND ESOPHAGITIS.

(Eng.)
Simeone, J. F.; Burrell, M.; Toffler, R.;
mith, W. (Yale-New Haven Hosp., New Haven, CT).
adiology 123(1):9-14; 1977.

Aperistalsis of the esophagus was reported in six patients with esophagitis in order to stress its diagnostic value in severe esophagitis. Aperistalsis was observed in reflux (2 patients), caustic (3 patients), and infectious (monileal, 1 patient) esophagitis and was reported to occur both as a transient phenomenon with no further sequelae, and as the initial manifestation of involvement in patients who subsequently suffered stricture. On the basis of biopsy and autopsy specimens (2 patients, showing extensive perineural involvement by inflammatory cells in Auerbach's plexus), a possible mechanism of aperistalsis related to the damage to neurons in auerbach's plexus is suggested. It was concluded that absence of peristalsis is the first significant clue in evaluation of esophageal inflammation in several cases.

4794 EFFECT OF BETHANECHOL ON GASTROESOPHAGEAL REFLUX.

(Eng.) Miller, W. N.; Ganeshappa, K. P.; Dodds, W. J.; Hogan, W. J.; Barreras, R. F.; Arnodorfer, R. C. (Medical Coll. Wisconsin, Milwaukee, WI). *Am. J. Dig. Dis.* 22(3):230-234; 1977.

The acute effects of bethanechol (5 mg, s.c.) on gastroesophageal reflux (GER) and lower esophageal sphincter pressure (LESP) were determined in 27 patients with symptomatic esophagitis. The effect of bethanechol on esophageal acid clearance was also determined in seven patients. Intraluminal pH monitoring prior to bethanechol administration demonstrated free or stress-induced reflux episodes in 18 patients. Patients without reflux had a mean prebethanechol LESP of 18.3 ± 9 mm Hg; this was significantly greater ($p<0.05$) than the LESP in patients with stress reflux (13.6 ± 9 mm Hg) and patients with free, as well as stress, reflux (9.2 ± 4 mm Hg). Bethanechol produced significant LESP elevation ($p<0.001$) in all three patient groups. GER disappeared in seven of the nine patients with stress reflux after bethanechol administration and in six of the nine patients with free and stress reflux. After bethanechol administration, acid clearance times decreased to normal levels in all patients, the mean values before and after administration, being 7.4 ± 2 and 2.7 ± 1 min ($p<0.005$), resp. The fact that some patients with reflux continued to have reflux despite LESP elevation to 30 mm Hg or more suggests that LESP is not the sole factor governing LES competency. Other factors such as improved esophageal emptying may also contribute to the beneficial therapeutic effect of bethanechol in patients with heartburn.

4795 DETECTION OF GASTROESOPHAGEAL REFLUX IN THE PEDIATRIC-AGE PATIENT BY ESOPHAGEAL INTRALUMINAL pH PROBE MEASUREMENT (TUTTLE TEST).

(Eng.) Euler, A. R.; Ament, M. E. (Center Health Sciences, Univ. California, Los Angeles, CA 90024). *Pediatrics* 60(1):65-68; 1977.

The esophageal intraluminal pH probe test (Tuttle test) was used in 24 pediatric patients (aged 4 weeks-16 yr) who had symptoms of gastroesophageal (GE) reflux to determine its sensitivity in detecting gastric acid reflux and to document its prognostic value. Eight children had a positive Tuttle test. Six of these patients failed a trial of medical management and required surgery to control their symptoms. None of these patients had GE reflux on esophagrams. Only 1 of 16 children with a negative test required surgery. This patient also did not have GE reflux on esophagram. The Tuttle test should be included in the diagnosis of pediatric patients with the clinical presentation of GE reflux.

4796 A COMBINED SYNCHRONOUS TECHNIQUE FOR THE McKEOWN THREE-PHASE OESOPHAGECTOMY. (Eng.) Royston, C. M. S.; Dowling, B. L. (Hammersmith Hosp., London, England). *Br. J. Surg.* 63(2):122-124; 1976.

4797 BRONCHOPULMONARY FOREGUT MALFORMATIONS. A UNIFYING ETIOLOGICAL CONCEPT. (Eng.) Heithoff, K. B.; Sane, S. M.; Williams, H. J.; Jarvis, C. J.; Carter, J.; Kane, P.; Brennom, W. (Children's Health Center, 2525 Chicago Ave., South, Minneapolis, MN 55404). *Am. J. Roentgenol.* 126(1): 46-55; 1976.

4798 CONGENITAL ESOPHAGOBRONCHIAL FISTULA IN A 62-YEAR-OLD WOMAN. (Eng.) Becker, R. M.; Lesperance, R.; Despas, P.; Wilson, J. A. S. (Albert Einstein Coll. Medicine, Bronx, NY). *Chest* 69(1):110-112; 1976.

4799 PEPSIN, PEPSINOGEN, GASTRIN AND OTHER CLINICAL FEATURES IN BARRETT'S ESOPHAGUS [Abstract]. (Eng.) Mangla, J. C.; Schenk, E. A.; Desbaillets, L.; Guarasci, G.; Kubasik, N. P.; Turner, M. D. (Monroe Community Hosp., Rochester, NY). *Clin. Res.* 24(3):288A; 1976.

4800 ESOPHAGEAL OBSTRUCTION ASSOCIATED WITH SMALL BOWEL VOLVULUS. (Eng.) Berger, Scholz, F. J. (Lahey Clinic Foundation, Boston, M *Radiology* 119(1):39-40; 1976.

4801 DECREASED LOWER ESOPHAGEAL SPHINCTER PRESSURES (LESP) IN GASTROESOPHAGEAL REFLUX OF CHILDHOOD [Abstract]. (Eng.) Euler, A R.; Ament, M. E. (UCLA Sch. Medicine, Los Angeles CA 90024). *Pediatr. Res.* 10(4):353; 1976.

4802 EARLY EXPERIENCE WITH THE BOEREMA BUTTO FOR BLEEDING OESOPHAGEAL VARICES. (Eng Johnston, G. W.; Kelly, J. M. (Royal Victoria Hos Belfast, Ireland). *Br. J. Surg.* 63(2):117-121; 1976.

See also, 4483, 4484, 4523, 4724, 4760, 4871, 48
5177, 5215, 5228, 5231.

STOMACH

4803 IMMUNOHISTOCHEMICAL AND RADIOIMMUNOLOGICAL DEMONSTRATION OF α_1-FETOPROTEIN IN NONMALIGNANT CHANGES OF HUMAN GASTRIC MUCOSA. (Ger.) Falser, N.; Lederer, B.; Reissigl, H. (Pathologisches Institut der Universitat, Mullerstrasse 44, A-6020 Innsbruck, Austria). *Klin. Wochenschr.* 55(13):635-640; 1977.

The gastric mucosa, gastric juice, and serum from patients with nonmalignant and malignant changes of the gastric mucosa were analyzed for α_1-fetoprotein (AFP) by immunohistochemical (IHCh) and radioimmunological (RI) methods. The IHCh test was positive in 22/25 mucosa samples taken from the periphery of a gastric ulcer and in 13/15 samples from the site of a gastrojejunostomy after Billroth II resection. These patients showed chronic recurrent gastritis. The IHCh test was positive for fo of five patients with gastric adenocarcinoma and cinoma. For the same cases, the RI tests were po tive in 19/25, 12/15, and 4/5, resp. AFP could n detected in serum samples, but it was demonstrate by the RI method in the gastric juice of 16/40 pa tients with gastric ulcer and Billroth II resecti AFP was found in the serum of two of five cancer tients, and in the gastric juice of three of five cancer patients. The results were negative in 86/100 serum samples from healthy donors and in 84/100 samples from patients with gastric disease other than carcinoma or ulcer. The findings show that AFP is not only synthesized by embryonic or neoplastic tissue, but also by regenerating cell systems as an unspecific response to growth stimu tion.

304 ANTRAL GASTRIN CELLS AND SERUM GASTRIN IN ACHLORHYDRIA. (Eng.) Stockbrugger, R.; arsson, L. I.; Lundqvist, G.; Angervall, L. (Sahl- ren's Hosp., Univ. Gothenburg, 413 45 Gothenburg, weden). *Scand. J. Gastroenterol.* 12(2):209-213; 977.

ne number of antral gastrin cells in 45 patients ith achlorhydria due to severe atrophic corpus astritis or gastric atrophy was studied and rela- ed to the serum gastrin level and the degree of hronic antral gastritis. In 24 achlorhydric pa- ients with normal antral mucosa, the serum gastrin evel was 324 ± 56 pM, and the number of gastrin ells was 79.6 ± 7.5 cells/field of vision. The orresponding values for 11 achlorhydric patients ith chronic superficial antral gastritis were not ignificantly different, being 361 ± 186 pM and 3.0 ± 14.4 cells/field of vision, resp.; the cor- esponding values in 10 achlorhydric patients with trophic antral gastritis were significantly dif- erent ($p \leq 0.01$) from those in the other two groups, eing 15.0 ± 3.3 pM and 6.2 ± 3.3 cells/field of ision, resp. In a reference group of 12 subjects 5 with normal antral mucosa and 7 with chronic uperficial antral gastritis), the mean number of ntral gastrin cells was 52 ± 6.5 cells/field of ision. A positive correlation ($p<0.01$) was found etween serum gastrin levels and the mean number f antral gastrin cells/field of vision in the bove patients. These results indicate that, com- ared to subjects in the reference group, the umber of gastrin cells was significantly higher p<0.01) in the achlorhydric patients with normal r superficially inflamed antral mucosa and signif- cantly lower ($p<0.01$) in achlorhydrics with atro- hic antral gastritis. It is concluded that serum astrin generally is a good indicator of the pres- nce or absence of antral atrophic gastritis in chlorhydria.

805 SERUM GASTRIN AND ATROPHIC GASTRITIS IN ACHLORHYDRIC PATIENTS WITH AND WITHOUT ERNICIOUS ANEMIA. (Eng.) Stockbrugger, R.; ngervall, L.; Lundqvist, G. (Sahlgrenska Hosp., 1345 Gothenburg, Sweden). *Scand. Gastroenterol.* 1(7):713-719; 1976.

erum gastrin levels and the presence of circulating ntibodies against parietal cells and cytoplasmic hyroid antigen were compared in 42 patients with ernicious anemia (PA) and 35 achlorhydric patients ithout PA. In addition, the antral and corpus ucosa was examined gastroscopically in 38 patients. ean serum gastrin levels were significantly higher n the PA patients than in those with achlorhydria ithout PA ($p<0.01$). However, the percent distribu- ion of patients with normal or high levels was simi- ar in the two groups. High serum gastrin levels were ssociated with a normal or only slightly inflamed ntral mucosa, but low or normal levels of gastrin ere accompanied by atrophic antral gastritis. ntral atrophy was frequently associated with a eflux of bile-containing duodenal contents to the tomach. Atrophy of the corpus mucosa and degenera- ion or absence of parietal cells were observed in both groups, but the incidence was higher in the PA group. There was no difference in the levels of parietal and thyroidal antibodies between the two groups. The similarities in the symptoms of both groups support the theory that the achlorhydria group may be in a pre-PA state.

4806 LEUKOCYTE MIGRATION STUDIES IN GASTRIC CANCER DETECTION: AN APPROACH TOWARD IMPROVED SPECIFICITY AND SENSITIVITY. (Eng.) Zoller, M.; Matzku, S.; Schulz, U. (German Cancer Res. Center, Im Neuenheimer Feld 280, 6900 Heidelberg 1, W. Germany). *J. Natl. Cancer Inst.* 58(4): 897-904; 1977.

Peripheral blood WBC from patients with gastric cancer and other malignant and nonmalignant diseases and peripheral blood WBC from apparently healthy volunteers were tested in the leukocyte migration inhibition test with the use of four or five different 3-M KCl extracts of gastric cancer tissue. An operational criterion for defining sensitization of patients' WBC was developed, i.e., evidence in an individual sample of WBC of either decreased or increased migration areas (migration index ≤0.79 and ≥1.20, resp.), with three or more antigen extracts. With this definition as an indicator of sensitization, 91% of patients with gastric cancer, compared to 5% and 3% of patients with nonmalignant, nongastric diseases and normal controls, resp., were reactive. Patients with various nongastric cancers were sensitized in 36% of the cases. Gastritis and gastric, as well as duodenal, ulcers did not influence the reactivity of patients' WBC, but considerable sensitization was found in patients with atrophic gastritis or intestinalization. When classified by considering the reaction with individual tumor extracts, the specificity and the sensitivity of the test was markedly diminished; more false negative determinations were found in the group of gastric cancer patients, and the percentage of false positives in the group of nonmalignant diseases increased. The results suggest the presence of tumor-associated antigens in gastric cancer patients, against which the host elicits a cellular immune response. The high incidence of positive reactivity of WBC from patients with gastric cancer, together with the considerable cross-reactivity of WBC from patients with nongastric cancer, points to the expression of antigens with organ-related and widespread specificities

4807 ENDOSCOPIC ASPECT OF EARLY GASTRIC CARCINOMA. (Ger.) Kratochvil, P.; Brandstatter, G. (II. Medizinische Abteilung, Landeskrankenhaus, Auenbruggerplatz 1, A-8036 Graz, Austria). *Acta Med. Austriaca* 4(1):6-11; 1977.

One hundred thirty-one cases of gastric cancer, 25% of which were early gastric cancer, were diagnosed in a series of 3,060 gastroscopies. The symptoms in the early gastric cancer patients included pressure in the epigastric region, malaise, nausea, emesis, loss of appetite, weight loss, hematemesis, and aversion to meat. The duration of the complaints ranged from a few weeks to 2 yr (average, 8.9 months). Twenty-one of these patients were x-rayed prior to endoscopy; results were negative in 10/21, but they prompted gastroscopy in the other 11. Adenocarcinoma was diagnosed histologically in 20 cases, signet-ring cell carcinoma in 4, and solid carcinoma in 1. One patient with signet-ring cell carcinoma had infiltrated regional lymph nodes. Multicentric growth was found in four patients. The size of the tumor ranged from 5 x 5 mm to 37 x 20 mm. Early gastric cancer was found in the gastric stump in four patients 6, 19, 24, and 37 yr after Billroth II surgery for peptic gastric ulcer. Two-thirds of the other 21 cancers were localized to the antrum and one-third to the corpus. The findings indicate the diagnostic value of gastroscopy with biopsy and that the incidence of early gastric cancer is higher than generally believed.

4808 CARCINOMA AND POSSIBLE PRECANCEROUS CHANGES OF THE GASTRIC STUMP AFTER BILLROTH II RESECTION. (Eng.) Domellof, L.; Eriksson, S.; Janunger, K. G. (Univ. Hosp., S-901 85 Umea, Sweden). *Gastroenterology* 73(3):462-468; 1977.

To diagnose early stump carcinoma after Billroth II resection, an endoscopic follow-up was performed in 214 of 459 patients who had undergone primary surgery 20 yr previously for benign ulcer disease. The localization of macro- and microscopic mucosal changes was also studied. Three patients with stump carcinoma were found among 140 patients dead at the follow-up. Six carcinomas, among which two were early carcinomas, were diagnosed in the follow-up group. All carcinomas were found in men. Moreover, 1 patient with multifocal precancerous alterations of the stoma, 2 with tubular adenoma, and 20 with regenerative polyps (9.3%) were found. No significant difference was found in the ratio of original duodenal-gastric ulcer in patients with carcinoma or polyps when compared to other patients. The macro- and microscopic changes were most severe in the stoma, which seems to be a preferential site for carcinoma. The histological changes, however, did not differ in patients with or without carcinoma and polyps. At present, no evidence has been found indicating that histological findings such as chronic atrophic gastritis, intestinal metaplasia, or cystic dilatation of the gastric glands, can be regarded as an early indicator of malignant transformation. To achieve early detection of stump carcinoma, repeated gastroscopic examinations are recommended from 10 to 15 yr after Billroth II resections.

4809 FUNCTIONAL RENAL FAILURE AND HAEMORRHAGIC GASTRITIS ASSOCIATED WITH ENDOTOXAEMIA IN CIRRHOSIS. (Eng.) Clemente, C.; Bosch, J.; Rodes, J.; Arroyo, V.; Mas, A.; Maragall, S. (Hospital Clinico y Provincial, C/Casanova 143, Barcelona, Spain). *Gut* 18(7):556-560; 1977.

The Limulus lysate test was used to determine the presence of endotoxemia in cirrhotic patients to study the association between functional renal failure and endotoxemia. Forty-three patients wit cirrhosis and ascites, 21 with normal renal functi 10 with a progressive functional renal failure (FR and 12 with a steady FRF were studied. Endotoxemi was found in 9 patients with FRF and in none of th 21 with normal renal function ($p<0.01$). A positiv Limulus test was almost exclusively associated wit a progressive FRF (8/10 patients), and all but one of these patients died. Renal function improved as endotoxemia disappeared in the survivor. Endotoxemia was also associated with hemorrhage due to acute erosions of the gastric mucosa, being presen in six of the seven patients with this complicatio Intravascular coagulation was not found in any patient. The Limulus test was positive in the ascit fluid in 18 of 21 patients tested, although only 2 of them had peritonitis. These results suggest that endotoxemia may play a critical role in the development of progressive renal failure and hemorrhagic gastritis in cirrhosis, and emphasize the potential risk of procedures involving reinfusion of ascitic fluid.

4810 EFFECT OF CHOLESTYRAMINE ON THE SYMPTOMS OF REFLUX GASTRITIS: A RANDOMIZED, DOUB BLIND, CROSSOVER STUDY. (Eng.) Meshkinpour, H.; Elashoff, J.; Stewart, H., III; Sturdevant, R. A. (Irvine Medical Center, 101 City Drive South, Orange, CA 92668). *Gastroenterology* 73(3):441-443 1977.

To examine the value of cholestyramine in the treatment of the symptoms of postsurgical reflux gastritis, a randomized, double-blind crossover st was carried out in 16 patients. No differences in frequency of abdominal pain, nausea, vomiting, or bitter taste were observed among cholestyramine (4 g, t.i.d., for 3 weeks), placebo, and routine (dietary restriction and *ad libitum* antacid) treatment periods. It is concluded that this regimen o cholestyramine is ineffective in symptomatic treatment of bile reflux gastritis.

4811 DUODENOGASTRIC REFLUX AND ANASTOMOSIS UL CERS. AN EXPERIMENTAL STUDY. (Ger.) Dahm, K.; Eichfuss, H. P.; Knipper, A.; Mitschke, (Abteilung Allgemeinchirurgie der Chirurgischen Klinik, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Z. Gastroenterol.* 15(1):9-20; 1977.

The effect of duodenal bypass with or without duodenogastric reflux on the development of ulcers of an anastomosis between the stomach and the duodenu was studied in male Wistar rats. Gastroduodenal reflux was produced in 32 rats by bypassing the py lorus. Duodenal stasis was observed in 24. Stasi and the continuous reflux of bile and pancreatic secretion were the major etiological factors of th peptic ulcers found in 29/32 rats. Duodenogastric reflux without a pyloric bypass was produced in 10 animals. They showed only slight duodenal stasis, and the incidence of ulcers was considerably lower (2/10). Duodenal bypass without duodenogastric reflux was produced in 12 rats. They showed no du denal stasis at all, and only one rat developed an ulcer. Duodenogastric reflux significantly inhibited hydrochloric acid secretion; in view of the results, however, hydrochloric acid plays no important role in the genesis of experimental anastomotic ulcers. The findings suggest that reflux and stasis are the etiological factors of jejunal peptic ulcer in man.

4812 MULTIPLE RECURRING GASTRIC EROSIONS (APHTHOUS ULCERS). (Eng.) Morgan, A. G.; McAdam, W. A. F.; Pyrah, R. D.; Tinsley, E. G. F. (Airedale General Hosp., Steeton, Keighley, West Yorkshire, England). *Gut* 17(8):633-639; 1976.

Five patients (ages 29-56 yr) who had repeated endoscopy because of continuing dyspeptic symptoms associated with a negative barium meal examination are described. All presented with upper abdominal pain (which included hematemesis in one patient) and with longstanding barium-negative symptoms. On endoscopy, they were found to have aphthous ulcers of the stomach; on prolonged endoscopic followup, these were shown to be persistent. No etiological cause could be found, and conventional management (antacids, metoclopramide, carbenoxolone) failed to control either the symptoms or ulceration. In two patients, a highly selective vagotomy was carried out after a year of unsuccessful medical therapy. In both patients, the relief of symptoms was dramatic, and repeated endoscopies have shown no further aphthous ulceration. The ulceration had been accompanied by chronic gastritis in one of these patients. The favorable response to vagotomy in these patients suggests that future patients could be treated with H_2 receptor antagonists, which reduce basal and maximal acid output and pepsin to the same extent as does vagotomy.

4813 THE GLANDULAR CYST, A POLYPOID LESION OF THE GASTRIC MUCOSA. (Ger.) Elster, K.; Eidt, H.; Ottenjann, R.; Rosch, W.; Seifert, E. (Pathologisches Institut, Stadtische Krankenanstalten, Kulmbacher Strasse 23, 8580 Bayreuth, W. Germany). *Dtsch. Med. Wochenschr.* 102(6):183-187; 1977.

Epithelial gastric polyps were reclassified on the basis of a histological study of >500 cases. They were found to consist of: (1) focal hyperplasia and hyperplasiogenic polyps arising from the gastric pit and leading to hyperplasia or hyperplasia with adenomatous components; (2) highly differentiated adenomas arising from glandular bodies, leading to blastomas of the antrum, pylorus, and cardia; (3) moderately differentiated adenomas from glandular ducts, leading to blastomas, chiefly of the cardia; (4) protruding borderline lesions from glandular ducts, leading to atypical hyperplasia and blastomas; and (5) early carcinomas from glandular ducts, leading to blastomas. One hundred ten cases of polypoid mucosal changes could not be classified. The polyp-like structures grow to a maximum diameter of 8 mm and are characterized histologically as noninflammatory cysts of different sizes located within the fundal glands. They may be the result of hamartomas or functional secretory disorders. These glandular cysts, which do not fit the picture of cystic gastritis, have not been described previously. They are of clinical significance since they must be differentiated from gastric polyposis.

4814 ULTRASONIC PATTERNS OF SPACE OCCUPYING LESIONS OF THE STOMACH AND THE INTESTINE. (Eng.) Lutz, H. T.; Petzoldt, R. (Dept. Internal Medicine, Univ. Erlangen-Nurnberg, D852 Erlangen, W. Germany). *Ultrasound Med. Biol.* 2(2):129-132; 1976.

Experience with 40 patients in whom ultrasonic scanning was used in the detection of space-occupying lesions of the stomach and intestine is presented. Ultrasonic scanning revealed a lesion below the edge of the left liver lobe or on the left side of the liver (corresponding to a gastric lesion) in 24 patients. In 15 of these patients, a gastric tumor had already been diagnosed by x-ray examination, and ultrasound was carried out to examine the liver. In the remaining patients, ultrasound was the primary examination. A small intestinal lesion was detected by ultrasound in five patients, three of whom had a palpable tumor. A tumor of the large intestine was visible using ultrasonography in 11 patients; in 4 cases, the tumor was primarily detected by ultrasonic scanning. The typical sonographic pattern of the lesions consisted of strong echoes in the center and a virtually anechoic mantle. Malignant tumors were diagnosed at endoscopy or operation in 21 patients with a stomach lesion and in 3 patients with a small intestinal lesion. The nonmalignant lesions included one case showing giant gastric folds typical of Menetrier's disease, two large gastric ulcers, an inflammatory small intestinal lesion due to Crohn's disease, and a small intestinal perforation.

4815 ULTRASTRUCTURAL OBSERVATIONS OF THE MYENTERIC PLEXUS OF THE PYLORUS IN INFANTILE HYPERTROPHIC PYLORIC STENOSIS. (Eng.) Challa, V. R.; Jona, J. Z.; Markesbery, W. R. (Univ. Kentucky Medical Center, Lexington, KY 40506). *Am. J. Pathol.* 88(2):309-322; 1977.

The ultrastructure of myenteric plexuses and smooth muscle of the pylorus obtained by biopsy at pyloromyotomy in five infants with hypertrophic pyloric stenosis were studied. Pyloruses from two infant and two adult rabbits and two adult rats were used as controls. The principal findings in the plexuses of the patients were moderate numbers of variably sized, swollen degenerating axons that contained dense bodies, lamellated figures, vacuoles, granular or fibrillar material, and swollen mitochondria. Neurons in the plexuses showed no definite abnormalities. Although these findings do not confirm previous light microscopic observation of neuronal changes in the pyloric myenteric plexuses, they do not exclude a neurogenic mechanism for this disorder. The presence of small immature neurons and large mature neurons suggests that neuronal maturation and development in infantile hypertrophic pyloric stenosis are not impaired as previously reported. No ultrastructural changes were found in interstitial cells of the myenteric plexuses. Except for hypertrophy of the circular smooth muscle layers, no specific alterations were found in muscle fibers of the pylorus.

4816 SURGICAL PROPHYLAXIS OF GASTRODUODENAL COMPLICATIONS ASSOCIATED WITH RENAL ALLOTRANSPLANTATION. (Eng.) Uhlschmid, G.; Largiader, F. (Kantonsspital, CH-8091 Zurich, Switzerland). *World J. Surg.* 1(3):397-405; 1977.

The value of prophylactic ulcer operations (i.e., vagotomy) in potential renal allograft recipients who appeared to be likely to develop a peptic ulcer was studied. From 1971 to 1975, 226 patients received kidney allografts, and prophylactic ulcer surgery was regularly performed prior to kidney transplantation in those who had a history of previous ulcer, symptoms of peptic ulcer, a demonstrable ulcer on x-ray or endoscopy, gastric acid hypersecretion, or a temperment conducive to the development of peptic ulcer. The results of this prophylactic program were compared with those of the previous period from 1964 to 1970 when prophylactic ulcer surgery was not used in 77 kidney allograft recipients, and with those of the concurrent period obtained in 194 recipients who did not receive surgical prophylaxis. Initially, the prophylactic operation was truncal vagotomy with pyloroplasty, then it was proximal selective vagotomy (PSV) without pyloroplasty, and finally it was selective gastric vagotomy with pyloroplasty (SGV + P). The incidence of gastroduodenal complications in patients who did not receive prophylactic ulcer surgery was 22.1% during the period 1964-1970, and 15.9% during the period 1971-1975; the mortality rates from gastroduodenal complications were 10.4% and 4.6%, resp. In contrast, only 1 of 32 renal transplant recipients who underwent prior prophylactic ulcer surgery developed a gastrointestinal complication, and there were no deaths in the prophylactic surgery group. Two patients developed fatal ischemic gastric necrosis following PSV, which led to the adoption of SGV + P as the prophylactic operation of choice. Prophylactic ulcer surgery has substantially reduced the incidence and mortality of gastroduodenal complications following renal transplantation.

4817 GASTROSCOPIC "GIANT TONGS BIOPSY"--AN ALTERNATIVE FOR LOOP BIOPSY? (Ger.) Nuesch, H. J.; Sulser, H.; Deyhle, P. (Medizinische Poliklinik, Departement fur Innere Medizin, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):718-719; 1976.

4818 GASTROENTEROSTOMY, INDICATIONS--COMPLICATIONS--REPARATION. (Ger.) Eichen, R.; Eichfuss, H. P.; Dorner, A.; Koch, G. (Chirurgische Universitatsklinik und -Poliklinik Hamburg-Eppendorf, Abteilung fur Allgemeinchirurgie, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Zentralbl. Chir.* 102(3):150-155; 1977.

4819 THE BILLROTH I-RESECTION AND ITS PITFALL (Ger.) Neudel, G. (Chefarzt der Chirurgischen Klinik Dolau des Bezirkskrankenhauses Hall S., DDR-4021 Halle/Saale, Rontgenstr., E. Germany) *Zentralbl. Chir.* 102(4):199-208; 1977.

4820 CARCINOMA OF RESECTED STOMACH--DIAGNOSTI CONSEQUENCES FOR PRACTICE. (Ger.) Kobl E.; Sauberli, H.; Nuesch, H. J.; Ammann, R.; Deyhl P. (Departement fur Innere Medizin, Universitat Zurich, Ramistrasse, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):722-723; 1976.

4821 THE SPECIFICITY OF GLUTAMINE METABOLISM IN PRETUMORAL DISEASES AND IN HUMAN GASTRIC CARCINOMA. (Rus.) Berezov, T. T.; Aptekar, L. S.; Zinevich, A. K. (Medical Faculty, P. Lumumb Univ., Moscow, USSR). *Vopr. Med. Khim.* 23(4):555 558; 1977.

4822 DETECTION OF GASTRIC CANCER AMONG PATIEN UNDER OBSERVATION FOR ACHLORHYDRIC GASTRITIS. (Rus.) Drugova, T. A.; Sagaidak, V. (Dept. Epidemiology Malignant Tumors, Oncological Scientific Center, Moscow, USSR). *Klin. Med. (Mos* 54(10):60-63; 1976.

4823 LEIOMYOBLASTOMAS OF THE STOMACH. (Ger.) Haupt, R.; Arnoldt, K. H.; Clauss, D. (Pathologisches Institut, Bezirkskrankenhaus St. Georg Leipzig, DDR-7021 Leipzig, Strasse der DSF 141, E. Germany). *Zentralbl. Chir.* 102(4):220-225 1977.

4824 ISOLATED PRIMARY MALIGNANT LYMPHOMA OF THE STOMACH. REPORT OF 5 CASES [Abstrac (Fre.) Guivarch, M.; Mouchet, A.; Marquand, J.; Fraget, P. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):305; 1977.

4825 ROENTGENOLOGICAL ASSESSMENT OF THE EVACUATING MOTOR FUNCTION OF THE GASTROINTESTINAL TRACT IN THE DIAGNOSIS OF DUMPING SYNDROME. (Rus.) Fil'shtinskii, A. Ia. (Dept. Surgery, Donetsk Medical Inst. Div. Postgraduate Medical Studies, Donetsk, USSR). *Klin. Khir.* (10):43-47; 1976.

4826 OBSERVATIONS ON THE THERAPY OF DYSPEPSIA WITH A NEW DRUG COMBINATION. (Ita.) Corsini, P.; Lepore, R.; Mordini, M.; Quaranta, S. (Ospedale della Misericordia, Grosseto, Italy). *Clin. Ter.* 78(3):253-263; 1976.

4827 PATHOPHYSIOLOGICAL SIGNIFICANCE OF HYPERGASTRINEMIA IN MAN. (Fre.) Soule, J.

C.; Accary, J. P.; Mignon, M. (Service d'Hepato-Gastroenterologie, C.H.U. Henri-Mondor et INSERM U-99, Creteil, France). *Gastroenterol. Clin. Biol.* 1(2):171-186; 1977.

4828 LOCALIZED PSEUDOTUMOROUS FORM OF MENETRIER'S DISEASE. (Fre.) Jankowski, J. M.; Brizon, J.; Gasse, J. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(6/7):608; 1977.

4829 PREVENTION OF STRESS ULCER IN DECOMPENSATED CHRONIC RESPIRATORY INSUFFICIENCY [Letter to Editor]. (Fre.) Castaing, R.; Favarel-Garrigues, J. C. (Hopital des Enfants, Cours de l'Argonne, F 33075 Bordeaux Cedex, France). *Nouv. Presse Med.* 6(14):1233; 1977.

4830 GASTRIC AND DUODENAL ULCER AS A COMPLICATION OF LARYNGECTOMY [Abstract]. (Ger.) Neiger, M.; Hemmeler, W. (HNO-Klinik, Inselspital, Bern, Switzerland). *O.R.L.* 39(1):33; 1977.

4831 GASTRIC SECRETION AND ULCEROUS GASTRODUODENAL HEMORRHAGE. (Rus.) Orlikov, G. A. (Propedeutic Dept. Internal Diseases, Riga Medical Inst., Riga, USSR). *Klin. Med. (Mosk.)* 54 (11):71-73; 1976.

See also, 4488, 4495, 4523, 4533, 4560, 4564, 4703, 4721, 4740, 4741, 4742, 4743, 4757, 4758, 4760, 4761, 4762, 4794, 4795, 4797, 4832, 4834, 4835, 4837, 4838, 4840, 4849, 4857, 4860, 4862, 4977, 5128, 5130, 5175, 5177, 5182, 5191, 5212, 5221, 5223, 5229, 5232, 5233.

STOMACH

Peptic Ulcers

4832 POSTPRANDIAL GASTRIC, PANCREATIC, AND BILIARY RESPONSE TO HISTAMINE H_2-RECEPTOR ANTAGONISTS IN ACTIVE DUODENAL ULCER. (Eng.) Longstreth, G. F.; Vay, L. W.; Go, M. D.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(1):9-13; 1976.

The effect of 200 mg and 300 mg doses of cimetidine (an H_2-receptor antagonist) taken orally with an ordinary meal on gastric, pancreatic, and biliary functions of 10 male patients with active gastric duodenal ulcer was studied. The inhibition of secretory output of postprandial gastric secretion in duodenal ulcer after 200 mg and 300 mg cimetidine administration, resp., was acid, 38.5 ± 3.2%, 65.5 ± 7.8%; pepsin, 30.3 ± 12.0%, 31.6 ± 11.8%; and volume, 27.4 ± 5.9%, 39.5 ± 11.4%. The 300-mg dose markedly reduced gastric secretion without affecting gastric emptying or pancreatic or biliary function; therefore, this dose of cimetidine should prove effective in the management of acid-peptic disease. Because cimetidine appears to be less effective postprandially than during nocturnal fasting, a larger dose or adjuvant therapy may be indicated with meals.

4833 COMPARISON OF AN H_2 RECEPTOR ANTAGONIST AND A NEUTRALIZING ANTACID ON POSTPRANDIAL ACID DELIVERY INTO THE DUODENUM IN PATIENTS WITH DUODENAL ULCER. (Eng.) Deering, T. B.; Malagelada, J. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 73(1):11-14; 1977.

The effects of cimetidine and antacid on postprandial acid delivery into the duodenum were compared in six duodenal ulcer patients. Cimetidine (400 mg) with an ordinary solid meal decreased the 4-hr delivery of titratable acid and hydrogen ion into the duodenum by 63% and 86%, resp., ($p<0.01$ versus control). Liquid Maalox (30 ml), 1 and 3 hr after an identical meal, reduced 4-hr delivery of acid by 47% and 74%, resp. ($p<0.01$). During the study period, the H_2 receptor antagonist reduced gastric acidity and the delivery of acid into the duodenum continuously. The liquid-neutralizing antacid produced a more fluctuating decrease in these parameters. However, in these dosages, the magnitude and duration of the acid-reducing effect were similar for both treatments.

4834 IS REDUCED RELEASE OF GASTRIN THE MECHANISM OF ULCER HEALING AFTER GASTROENTEROSTOMY? (Eng.) Lam, S. K.; Sircus, W.; Byrnes, D. J. (Univ. Hong Kong, Hong Kong). *Am. J. Dig. Dis.* 22(5):397-401; 1977.

To study how gastroenterostomy promotes healing, the effect of this procedure on the gastrin response to meals was studied 3 weeks and 26 weeks after surgery in nine patients. Nine normal subjects served as controls. The patients (aged 24-58 yr, mean 39.7 yr) all had uncomplicated duodenal ulceration and a mean acid output (MAO) response to pentagastrin of 6 μg/kg before surgery. As compared with the preoperative levels, the gastrin response to the standard meal was lower at 30, 40, and 60 min after 3 months and after 6 months. A significant drop occurred in the postprandial levels at 45 and 60 min after 6 months, and at 90 min after both 3 and 6 months ($p<0.05$ at 45 min, $p<0.01$ at 60 min, $p<0.001$ at 6 months). The mean integrated gastrin response (IGR) to a meal was higher in the unoperated patients than in the controls ($p<0.0005$). The IGR fell to between 35% and 75% of the preoperative levels in five of seven patients. Six months after operation, the IGR in all but one patient was significantly lower than before ($p<0.05$), the mean percentage fall being 31.1%. The mean IGR at 6 months was significantly greater than that of the controls. These studies show that gastroenterostomy is followed by significant changes in the postprandial secretion of gastrin during both the gastric and the intestinal phases of meal response.

4835 GASTRITIS DUODENITIS, AND CIRCULATING LEVELS OF GASTRIN IN DUODENAL ULCER BEFORE AND AFTER VAGOTOMY.

(Eng.) Meikle, D. D.; Taylor, K. B.; Truelove, S. C.; Whitehead, R. (Radcliffe Infirmary, Oxford, England). *Gut* 17(9):719-728; 1976.

Biopsy specimens were taken from five standard sites in the stomach and from the duodenal bulb in 20 patients with duodenal ulcer to investigate the association of gastritis and duodenitis with duodenal ulcer. The effects either of truncal vagotomy and pyloroplasty (TVP) or of highly selective vagotomy with drainage (HSV) on the stomach and duodenal bulb mucosa were also investigated in these patients. All investigations were carried both before and 3 months after surgery. Gastritis was present in almost all patients with duodenal ulcer, but it tended to be concentrated and to be most severe in the antrum and along the lesser curve of the stomach in over half the patients. Gastritis was also present in the body of the stomach, but only three patients had gastritis in the fundus. Chronic duodenitis was found in the duodenal bulb in all these patients. After vagotomy, there was a marked increase in both the extent and severity of the proximal gastritis in both treatment groups, but the distal gastritis remained almost unchanged. There was no significant change in the incidence of duodenitis after vagotomy, but its severity was lessened. No correlation was found between the peak acid output (PAO) in response to betazole hydrochloride and the severity of the gastritis or the duodenitis either before or after operation, with one exception; the postoperative PAO was significantly less in those patients who developed a severe proximal gastritis after vagotomy. No relationship was found between the severity of the distal gastritis and the serum gastrin levels. No correlation was found between either the basal or peak acid output and the corresponding serum gastrin levels before or after either type of vagotomy. This suggests that lesser vagal activity than that occurring during an insulin test is not an important factor in the stimulation of gastrin release from the antrum.

4836 STIMULATION OF GASTRIC INHIBITORY POLYPE TIDE IN NORMAL AND DUODENAL ULCER PATIEN

(Eng.) Cataland, S.; O'Dorisio, T. M.; Brooks, R. Mekhjian, H. S. (410 West 10th Ave., Columbus, OH 43210). *Gastroenterology* 73(1):19-22; 1977.

To investigate the role of gastric inhibitory polypeptide (GIP) in the hypersecretion associated wit duodenal ulcer, serum GIP concentrations in 11 healthy subjects and 16 duodenal ulcer patients we compared after the stimulation of GIP release by a mixed meal. Fasting and postprandial serum gastri and GIP concentrations were measured by radioimmun assay at frequent intervals. The duodenal ulcer patients showed an augmented and significantly greater release of GIP compared to normal subjects at 5, 15, 30, 60, 120, and 180 min after the ingestion of the test meal ($p<0.05$). The fasting gastr level in the controls was 32 ± 2 pg; after the mea rose to 84 ± 10 and 80 ± 6 pg/ml at 5 and 15 min, declining thereafter to 79 ± 6, 74 ± 6, 48 ± 3, an 42 ± 3 pg/ml at 30, 60, 120, and 180 min, resp. T mean fasting gastric concentration in the duodenal ulcer patients was 64 ± 6 pg, and it rose to 147 ± 29, 186 ± 43, and 192 ± 35 pg/ml at 5, 15, and 30 min and declined to 161 ± 35, 115 ± 18, and 106 ± pg/ml at 60, 120, and 180 min, resp. All values were significantly greater than those in controls ($p<0.05$).

4837 PERFORATED DUODENAL ULCER: IS THE DISTINCTION BETWEEN ACUTE AND CHRONIC VALID

(Eng.) Dent, D. M.; Bank, S.; Louw, J. H. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 51(16):529-531; 1977.

Perforations of acute and chronic duodenal ulcers were compared in 70 patients to identify any biolo ical features that may help to differentiate acute and chronic ulcers. Age, racial incidence, acid output, and histology of the ulcer at the time of perforation were analyzed. The mean age for the acute group was 40 yr and for the chronic group 37 yr. The proportions of acute to chronic remained approximately 1:3 in each decade. The mean basal acid output measured 6 weeks postoperatively was 3.9 ± 2.3 mEq/hr for the acute group and 4.5 ± 3.1 mEq/hr for the chronic group. The mean maximal acid output for the acute group was 25.2 ± 7.7 mEq/hr and for the chronic group, 27.4 ± 10.3 mEq/hr ($p>0.2$). Biopsy of the ulcer edge at the time of closure was carried out in 14 acute patients and 3 chronic patients. Fibrosis was present in all acut cases and in 25 chronic cases. Granulation tissue occurred in eight chronic cases. The results show no significant differences between the ulcer types, using the above variables. The authors conclude that the only true "acute" ulcer is the rare stress ulcer.

4838 RESULTS OF SURGICAL TREATMENT OF PEPTIC ULCER IN OLD AGE.

(Ger.) Erichsen, J. (D-2000 Hamburg 60, Rubenkamp 148, W. Germany). *Zentralbl. Chir.* 102(5):305-313; 1977.

4839 THE PREPYLORIC FINSTERER-OPERATION: TECHNIQUE AND RESULTS. (Ger.) Clauss, D.; Quast, M. (Chirurgische Klinik des Bezirkskrankenhauses St. Georg, DDR-7021 Leipzig, Strasse der DSF 141, E. Germany). *Zentralbl. Chir.* 102(9):544-547; 1977.

4840 PRIMARY RESECTION IN PERFORATED GASTRIC AND DUODENAL ULCERS. (Ger.) Burczyk, P.; Kopetsch, K. (Chirurgische Klinik des Bezirkskrankenhauses, DDR-65 Gera, Strasse des Friedens 122, E. Germany). *Zentralbl. Chir.* 102(4):209-211; 1977.

4841 POSTOPERATIVE ABDOMINAL COMPLICATIONS AFTER THORACIC SURGERY. (Ger.) Franz, W. D. (Forschungsinstitut fur Lungenkrankheiten und Tuberkulose, DDR-1115 Berlin-Buch, Karower Str. 11, E. Germany). *Zentralbl. Chir.* 102(10):621-623; 1977.

4842 THE POSTVAGOTOMY SYNDROME. (Ger.) Stremmel, W. (Chirurgische Universitatsklinik, Hugstetter Str. 55, D-7800 Freiburg/Br., W. Germany). *Zentralbl. Chir.* 102(4):231-235; 1977.

4843 PATHOGENESIS OF POSTVAGOTOMY SYNDROME. (Ger.) Stremmel, W. (Chirurgische Universitatsklinik, Hugstetter Str. 55, 7800 Freiburg, W. Germany). *Dtsch. Med. Wochenschr.* 101(41):1496-1497; 1976.

4844 THERAPY OF POSTVAGOTOMY SYNDROME. (Ger.) Stremmel, W. (Chirurgische Universitatsklinik, Hugstetter Str. 55, 7800 Freiburg, W. Germany). *Dtsch. Med. Wochenschr.* 101(41):1497-1498; 1976.

4845 FAILURE TO CONFIRM EVIDENCE FOR EXISTENCE OF TWO POPULATIONS WITH DUODENAL ULCER. (Eng.) Prescott, R. J.; Sircus, W.; Lai, C. L.; Lam, S. K. (Univ. Edinburgh Medical Sch., Edinburgh, Scotland). *Br. Med. J.* 2(6037):677; 1976.

4846 DUODENAL ULCER: ENDOSCOPIC FINDINGS AND PSYCHOSOCIAL STATUS. (Ger.) Jenny, S.; Deyhle, P. (Medizinische Universitatspoliklinik, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):728; 1976.

4847 ALCOHOL, ASPIRIN, DEPRESSION, SMOKING, STRESS AND THE PATIENT WITH A GASTRIC ULCER. (Eng.) Bock, O. A. A. (Dept. Medicine, Univ. Stellenbosch, Parowvallei, South Africa). *S. Afr. Med. J.* 50(9):293-297; 1976.

4848 STUDIES ON FACTORS AFFECTING HEALING OF GASTRIC ULCER. A PROSPECTIVE, COOPERATIVE STUDY IN JAPAN. (Eng.) Nakajima, T. (Toyonaka City Hosp., 2-1-1 Okakamin-cho, Toyonaka City, Osaka, Japan). *Am. J. Gastroenterol.* 66(2):150-154; 1976.

4849 GASTRIC CELL LOSS, MUCUS SECRETION, AND THE HEALING OF GASTRIC ULCERS [Abstract]. Croft, D. N.; Domschke, W.; Domschke, S.; Hagel, J.; Demling, L. (St. Thomas' Hosp., London, England). *Gut* 18(5):A405; 1977.

4850 SPONTANEOUS HEALING OF PEPTIC ULCER OF THE STOMACH AND DUODENUM. (Ger.) Scheurer, U.; Witzel, L.; Keller, H. M.; Huber, R.; Galeazzi, R.; Halter, F. (Abteilung fur Gastroenterologie, Inselspital, CH-3010 Bern, Switzerland). *Z. Gastroenterol.* 14(7):725; 1976.

4851 THERAPY OF PEPTIC ULCER WITH ANTACIDS AND ANGIOLYTICS. RESULTS OF LONG-TERM TREATMENT. (Ita.) Michetti, P.; De Conca, V. (Ospedali Galliera, Genova, Italy). *Clin. Ter.* 78(5):463-469; 1976.

4852 THE RESULTS OF PEPTIC ULCER SURGERY. (Eng.) Louw, J. H.; Marks, I. N. (Dept. Surgery, Univ. Cape Town, Cape Town, South Africa). *J. R. Coll. Surg. Edinb.* 22(1):19-34; 1977.

4853 METABOLIC BONE DISEASE AFTER TRUNCAL VAGOTOMY AND GASTROJEJUNOSTOMY [Abstract]. (Eng.) Irving, A. D.; Smith, G. (Dept. Surgery, Univ. Dundee, Dundee, Scotland). *Eur. Surg. Res.* 9(Suppl. 1):146-147; 1977.

4854 24 HOUR GASTRIC ACIDITY 4 YEARS AFTER VAGOTOMY [Abstract]. (Eng.) McCloy, R. F.; Girvan, D. P.; Baron, J. H. (Royal Postgraduate Medical Sch., Du Cane Rd., London, England). *Eur. Surg. Res.* 9(Suppl. 1):146; 1977.

4855 GASTRIC HISTAMINE CONCENTRATION IN DUODENAL ULCER PATIENTS IN RELATION TO ACID SECRETION AND TO SELECTIVE GASTRIC VAGOTOMY WITH PYLOROPLASTY [Abstract]. (Eng.) Troidl, H.; Lorenz, W.; Rohde, H.; Hamelmann, H. (Univ. Surgery Clinic, Marburg/Lahn, W. Germany). *Fed. Proc.* 36(3):1023; 1977.

4856 HUMAN GASTRIN RESPONSE AFTER ULCER SURGERY. (Eng.) Saik, R. P.; Weisenfeld, N.; Peskin, G. W. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, La Jolla, CA 92161). *J. Surg. Res.* 22(4):352-356; 1977.

4857 LATE OCCURRENCE OF PRECANCEROUS CHANGES ON THE GASTRIC STUMP AFTER BILLROTH II RESECTION FOR DUODENAL ULCER [Abstract]. (Eng.) Russo, A.; Sanfilippo, G.; Grasso, G.; Giannone, G.; Guerrera, C. (Clinica Chirurgica I dell'Universita, Catania, Italy). *Rend. Gastroenterol.* 9(1):55; 1977.

4858 PLASMA MOTILIN LEVELS IN DUODENAL ULCER AND THE EFFECT OF TRUNCAL VAGOTOMY AND HYPOGLYCEMIA [Abstract]. (Eng.) Christofides, N. D.; Bloom, S. R. (Hammersmith Hosp., London, England). *Gut* 18(5):A406-A407; 1977.

4859 GASTRIC CELL TURNOVER AND MUCUS PRODUCTION IN PATIENTS WITH GASTRIC ULCER AND THE EFFECT OF CARBENOXOLONE [Abstract]. (Eng.) Croft, D. N.; Domschke, W.; Domschke, S.; Hagel, J.; Demling, L. (St. Thomas' Hosp., London, England). *Rend. Gastroenterol.* 9(1):73; 1977.

4860 POSSIBLE ROLE OF BRAIN NEUROTRANSMITTERS AND RELATED COMPOUNDS IN THE PATHOGENESIS OF CYSTEAMINE-INDUCED DUODENAL ULCER [Abstract]. (Eng.) Szabo, S. (Peter Bent Brigham Hosp., Boston, MA 02115). *Fed. Proc.* 36(3):1019; 1977.

4861 GASTRIC SECRETION AND SERUM GASTRIN LEVEL IN FIBERENDOSCOPICALLY DETECTED MULTIPLE PEPTIC ULCER. (Ger.) Giacosa, A.; Turello, V.; Cheli, R. (Ospedali Civili di Genova, I-16132 Genova, Italy). *Z. Gastroenterol.* 14(7):726-727; 1976.

4862 GASTRIC ACID SECRETION AND POSTINSULIN GASTRIN RESPONSE: COMPARATIVE STUDY OF THE RESULTS BEFORE AND AFTER THE ADMINISTRATION OF β-BLOCKERS IN NONOPERATED AND VAGOTOMIZED DUODENAL ULCER PATIENTS. ROLE OF CATECHOLAMINES IN GASTRIC ACID SECRETION DURING HYPOGLYCEMIA [Abstract]. (Fre.) Fournet, J.; Hostein, J.; Fourque, B.; Bessard, G.; Gavend, M.; Bonnet-Eymard, J. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3): 306; 1977.

4863 IMMUNO-REACTIVE SOMATOSTATIN IN ACETIC
EXTRACTS OF DUODENAL, ANTRAL AND FUNDIC
BIOPSIES. (Fre.) Chayvialle, J. A.; Moulinier,
B.; Martin, A.; Lambert, R. (Hopital Edouard-Herr
F 69000 Lyon, France). *Ann. Endocrinol. (Paris)*
38(2):147-148; 1977.

4864 REGENERATIVE HYPERPLASIA SURROUNDING
BENIGN PEPTIC ULCER OF THE STOMACH: CY
LOGICAL DIAGNOSIS IN COMPARISON WITH HISTOLOGICAL
EXAMINATION [Abstract]. (Eng.) Botticelli, A. F
Rigo, G. P.; Rivasi, F.; Villani, M.; Perini, M.
(Istituto di Anatomia e Clinica Medica dell'Unive
sita, Modena, Italy). *Rend. Gastroenterol.* 9(1):
56; 1977.

See also, 4494, 4539, 4549, 4560, 4580, 4742, 476
4811, 4818, 4821, 4827, 4830, 5151, 518
5191, 5212, 5228.

SMALL INTESTINE

4865 THE CONTINENT ILEAL POUCH: ABSORPTIVE AND MOTOR FEATURES. (Eng.) Gadacz, T. R.; Kelly, K. A.; Phillips, S. F. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Gastroenterology* 76(6):1287-1291; 1977.

The absorptive and motor features of ileal pouches were studied in eight patients 6-40 months after proctocolectomy and construction of a continent ileal pouch, to determine whether the mucosa of the pouch retains the properties attributed to normal ileum. Test solutions of 100 or 200 ml, containing a nonabsorbable marker (phenolsulfonphthalein), were placed in the pouch and sampled serially for 1 hr; an oro-intestinal tube was used to prevent contamination of the pouch by endogenous secretions. Sodium was absorbed from test solutions containing 25, 75, and 120 mM sodium; absorption
from the lowest concentration represented movemen
against a concentration gradient of approximately
120 mM. The mucosal potential difference (PD) wa
small in magnitude (1-3 mV) but consistently negative, and sodium was thus absorbed by the pouch
against a steep electrochemical gradient. Chlori
was also absorbed against marked concentration
gradients, but its absorption was favored by the
small negative mucosal potential. Chloride absor
tion was greater in magnitude than corresponding
absorptions of sodium. Water was always absorbed
whenever electrolyte was absorbed. The addition
60 mM glucose increased the negativity of mucosal
PD in all pouches (from 6.2 to 16.0 mV). The pou
absorbed vitamin B_{12} that was instilled together
with intrinsic factor. There was a striking lack
of secondary bile acids in the duodenal bile in a
patients (0-10.8% secondary bile acids); this fac

and the distribution of the primary bile acids suggests that decreased dehydroxylation of bile acids occurs in pouch patients. The pattern of motility in the pouches was consistent with that reported previously for normal ileum. These results indicate that the functions of the mucosa and smooth muscle of the continent ileal pouch are similar to those of the normal ileum.

4866 HOME TOTAL PARENTERAL NUTRITION: AN ALTERNATIVE APPROACH TO THE MANAGEMENT OF CHILDREN WITH SEVERE CHRONIC SMALL BOWEL DISEASE.

(Eng.) Byrne, W. J.; Halpin, T. C.; Asch, M. J.; Fonkalsrud, E. W.; Ament, M. E. (UCLA Center for the Health Sciences, Los Angeles, CA 90024). *J. Pediatr. Surg.* 12(3):359-366; 1977.

The use of a home program of total parenteral nutrition (HTPN) for the management of six children (ages, 2.25-17 yr) with severe chronic small bowel disease over periods ranging from 1-11 months is described. There were two cases of chronic idiopathic intestinal pseudo-obstruction syndrome and one case each of Crohn's disease with enterocutaneous fistula, unclassified sprue with selective immunoglobulin A deficiency, short bowel syndrome with enterocutaneous fistula secondary to an anastomotic leak, and Crohn's disease with short bowel syndrome. Criteria for instituting this therapy were the inability to maintain fluid and nutritional balance on a therapeutic diet or p.o. formula or a need for 30 or more days of conventional total parenteral nutrition (TPN). The HTPN was accomplished using a Broviac catheter. The proximal end of this centrally placed silastic catheter exits on to the skin of the chest wall through a s.c. tunnel and has a Leur lock which allows it to be sealed off with a screw cap when not being used for TPN. The six patients had a total of 1,139 days on HTPN with one episode of catheter sepsis and one localized infection at the catheter site. None of the catheters clotted, but one was accidentally dislodged. Small bowel adaptation, which allowed gradual discontinuance of HTPN and reinstitution of total p.o. alimentation, occurred in four of the six patients. The HTPN program is recommended for children and adolescents with severe chronic small bowel disease who face prolonged hospitalizations.

4867 MORPHOLOGY OF THE SMALL BOWEL IN SMALL BOWEL ATRESIA AND STENOSIS.

(Ger.) Willnow, U. (Klinik und Ambulanz fur Kinderchirurgie des Bereichs Medizin, Karl-Marx-Universitat, Oststrasse 21-25, DDR-705 Leipzig, E. Germany). *Zentralbl. Chir.* 102(12):737-743; 1977.

The morphologic and pathogenetic aspects of small intestinal atresia and stenosis in 24 newborn babies operated on for these conditions are described. Atresia was found in 20 infants; it was localized to the ileum in 15 and the jejunum in 4; multiple atresia was found in 1. Stenosis was found in the jejunum of two infants and in the ileum of two others. Morphologically, the atretic section was characterized by flat, thin mucosa with a reduced number of villi, and the absence of longitudinal and circular stratification of the muscular layer. Inflammatory processes, circulatory disorders, or severe regressive structural changes of the mucosa were seen in all but five cases. Necrosis and ulceration of the mucosa were seen in 15. The mucosa was missing in four cases, the submucosal and myenteric plexus in five. The 10- to 15-cm inflated pre-atretic section usually showed a marked reduction of the thickness of the mucosa, submucosa, and muscular layer. Hemorrhagic and inflammatory processes, sometimes culminating in perforation and necrosis, were seen in 15 cases. The mouth of the intestine showed signs of compensatory hypertrophy. In stenosis, no major structural changes were seen apart from a marked hypertrophy of the muscular wall in the prestenotic section. Fetal accidents (necrosis, calcification, fibrosis, and hemosiderophages) and pathological changes of the intestine are assumed to be etiological factors in most cases of atresia. The prognosis of small intestinal atresia is determined by its localization and by the presence or absence of additional abdominal malformations (omphalocele, gastroschisis, and volvulus) and diseases such as mucoviscidosis and fetal peritonitis.

4868 PATHOPHYSIOLOGY OF ENLARGEMENT OF THE SMALL BOWEL FOLD.

(Eng.) Olmsted, W. W.; Reagin, D. E. (Armed Forces Inst. Pathology, Washington, DC 20306). *Am. J. Roentgenol.* 127(3):423-428; 1976.

The pathophysiology underlying enlargement of the valvulae conniventes during primary small bowel disease is described along with the most typical diseases with prominent folds leading to malabsorption. Lymphoma and regional enteritis are the most frequent small bowel diseases that cause malabsorption associated with thickening of folds; fold enlargement in both diseases is the result of packing of the lamina propria and submucosa with cells and edema. In Whipple's disease, the prominent fold is the major radiologic and pathologic finding, and the disease is distinguished microscopically by the presence of PAS-positive macrophages in the lamina propria of the small bowel wall. In early amyloidosis, glycoprotein is deposited in the lamina propria and submucosal perivascular spaces; as the disease progresses, the entire wall may be infiltrated and converted into a rigid tube. In lymphangiectasia, the striking pathologic abnormality is dilatation of the lymphatics of the lamina propria and submucosa. Nodular thickening of folds is the most prominent feature of nodular lymphoid hyperplasia associated with immunoglobulin deficiencies and infestation by *Giardia lamblia*. Secondary radiologic signs include mild dilatation and hypersecretion. When those diseases or conditions that occur the most frequently have been excluded (cardiac, hepatic or renal edema, regional enteritis, and lymphoma), Whipple's disease, amyloidosis, lymphangiectasia, and nodular lymphoid hyperplasia should be the main considerations in differential diagnosis of malabsorption. The diagnosis can be made radiologically on the basis of secretions and the characteristics and distribution of the enlarged folds. Lymphangiectasia and nodular lymphoid hyperplasic cause increased secretions. In Whipple's disease, the folds are generally irregular and somewhat disordered; in amyloidosis and lymphangiectasia the folds are more regular; those seen in nodular lymphoid hyperplasia are nodular. In Whipple's disease, the enlarged folds are located primarily in the duodenum and jejunum; the same is true for nodular lymphoid hyperplasia, although other parts of the small intestine may be affected. Thickening of the folds in amyloidosis and lymphangiectasia is generally distributed throughout the entire small bowel.

4869 THE IMMUNOGLOBULIN-BEARING CELLS IN THE LAMINA PROPRIA AND THE CLINICAL RESPONSE TO A GLUTEN-FREE DIET IN DERMATITIS HERPETIFORMIS. (Eng.) Vermeer, B. J.; Lindeman, J.; van der Harst-Oostveen, C. J. G. R.; Pena, A. S.; van Vloten, W. A. (Univ. Hosp., Rihnsburgerweg 10, Leiden, Netherlands). *Arch. Dermatol. Res.* 258(3):223-230; 1977.

Multiple duodenal and jejunal biopsies were carried out in 17 patients with dermatitis herpetiformis (DH) to determine the effect of a gluten-free diet on the 4,4'-sulfonyldianiline dose and on the numbers of immunoglobulin-containing cells in jejunal mucosa. In all patients, the small intestinal biopsy specimens showed histopathological changes compatible with celiac disease. Fourteen patients maintained a gluten-free diet (GFD) for more than 8 months. The small intestinal lesions improved in all patients investigated during the GFD. The dosage of 4,4'-sulfonyldianiline needed to control the skin lesions could be reduced by more than 50% in four patients and the drug could be stopped in five patients on GFD. The immunoglobulin-bearing cells in the lamina propria were counted in eight patients not on GFD, in six patients on GFD, and in eight healthy controls. The numbers of IgA-, IgM- and IgG-bearing cells were increased in most of the DH patients who were not on GFD. The number of IgM-bearing cells in the DH patients who were on GFD was the same as that in the control group. This may indicate a mainly IgM response in the lamina propria induced by gluten.

4870 MESODIVERTICULAR BAND. (Eng.) Johnson, G. F.; Verhagen, A. D. (Children's Medical Center, 1735 Chapel St., Dayton, OH 45404). *Radiology* 123(2):409-412; 1977.

Experience with Meckel's diverticula in eight patients is summarized, with particular emphasis on the importance of mesodiverticular band (MDB) in the production of intestinal obstruction as one of the important complications of Meckel's diverticulum. Six of the eight patients demonstrated evidence of intestinal obstruction. In two cases, MDB obstruction was suggested preoperatively, as the plain abdominal radiographs showed fluid-distended small bowel loops in the right lower quadrant. Small bowel obstruction was the only radiological observation in four cases. In one case, MDB was diagnosed preoperatively by barium contrast examination, and in two cases a soft-tissue mass was identified. In the remaining patient, who had presented with acute appendicitis rather than symptoms of intestinal obstruction, small bowel ileus together with medial cecal soft-tissue deformity were seen radiologically. Although gangrenous Meckel's diverticulum complicated one case, there was no free intraperitoneal air to indicate perforation. The anatomic features and the mechanism by which MDB produces obstruction are reviewed. The MDB is an embryologic remnant of the vitelline circulation that carries the arterial supply to Meckel's diverticulum. In the event of an error of involution, a patent or nonpatent arterial band persists and extends from the mesentery to the apex of the antimesenteric diverticulum. This creates a snare-like opening through which bowel loops may herniate and become obstructed, as occurred in the six cases of obstruction in this series.

4871 EOSINOPHILIC GASTROENTERITIS WITH ESOPHA INVOLVEMENT. (Eng.) Dobbins, J. W.; Sheahan, D. G.; Behar, J. (Yale Univ. Sch. Medicin 333 Cedar St., New Haven, CT 06510). *Gastroenterol* 72(6):1312-1316; 1977.

The case of a 51-yr-old man with clinical and hist logical evidence of eosinophilic enteritis with esophageal involvement is presented. The patient a lifelong history of asthma and hay fever and was investigated because of symptoms of esophageal spas Esophageal biopsies revealed elongated papillae an basal zone hyperplasia of the epithelial layer wit eosinophilic infiltration of the lamina propria an muscularis mucosae. There was no evidence of refl Small bowel biopsies revealed a flat mucosal patte with absent or blunted villi, tall columnar surfac epithelium, and eosinophilic infiltration of the lamina propria. He did not respond to a gluten-fr diet. This patient is thought to have eosinophili gastroenteritis with esophageal involvement, the first such case reported.

4872 INTRAMURAL DUODENAL HEMATOMA IN CHILDREN THE ROLE OF THE RADIOLOGIST IN ITS CONSERVATIVE MANAGEMENT. (Eng.) Mahboubi, S.; Kaufmann, H. J. (Children's Hosp., 34th St. and Civic Center Blvd., Philadelphia, PA 19104). *Gast intest. Radiol.* 1(2):167-171; 1976.

The clinical and radiologic findings in six childr with intramural duodenal hematoma are reported, an the case reports of two patients are presented. T hematoma was caused by blunt abdominal trauma in all cases. The symptoms included nausea, vomiting, upper abdominal pain, and lethargy. Serum amylase was elevated in only one case. Barium examination of the upper gastrointestinal tract was performed in all instances after plain abdominal films excluded the possibility of intestinal perforation. Subsequent conservative management consisted of restricted p.o. intake, i.v. infusions of fluids and electrolytes, and nasogastric suction. Spontaneous resolution of the hematoma, as judged by the complete disappearance of symptoms and the free passage of barium through the duodenum, occurred 2-20 weeks after the injury. No complications were encountered.

4873 RADIOGRAPHIC CHANGES AFTER SMALL BOWEL BYPASS FOR MORBID OBESITY. (Eng.) Wade, D. H.; Richards, V.; Burhenne, H. J. (Children's Hosp. San Francisco, P.O. Box 3805, San Francisco, CA 94119). *Radiol. Clin. North Am.* 14(3):493-498; 1976.

Normal roentgenographic findings following small bowel bypass for morbid obesity are reviewed for 38 patients who were studied 1 yr or more after surgery. Anastomosis of the end-to-side jejunoileostomy was visualized in 36 patients. Reflux of contrast material into the bypassed small bowel segment was observed in 29 patients. In 31 patients, the postoperative mucosal pattern showed an increase in the thickness of the valvulae conniventes. Small bowel transit time was decreased to less than 15 min in all 38 patients. Other findings included: increased small bowel diameter in 33 patients, large bowel dilatation in 19 patients, and increased air-fluid levels in the large and small bowel in 31 patients. The presence of multiple intestinal air-fluid levels and the distention of the jejunum and colon are common and expected postoperative sequelae of small bowel bypass procedures for morbid obesity, and the radiologist must be familiar with these findings to avoid the misdiagnosis of bowel obstruction. Marked colon distention and even megacolon also occur normally after small bowel bypass operations. Faint or absent gallbladder visualization after oral medication is a further roentgenographic finding with small bowel bypass procedures. Two-day medication for oral cholecystography followed by i.v. cholangiography is indicated in the event of nonvisualization.

4874 S-TRYPTOPHAN CONCENTRATIONS AFTER INTESTINAL BYPASS IN EXTREME OBESITY. (Eng.) Backman, L.; Johansson, C.; Thoren, P.; Allgen, L. G.; Hallberg, D. (Karolinska Hosp., Stockholm, Sweden). *Acta Med. Scand.* 201(4):285-289; 1977.

Serum tryptophan levels were determined in patients treated with jejunoileostomy for obesity. The frequency of psychiatric symptoms and their possible relation to a low tryptophan level were analyzed, and the serum levels during supplementation with tryptophan were examined. Jejunoileostomy was followed by a decreased level of S-tryptophan (mean preoperative level, 76.4 ± 4.4 μmol/l; 1st yr postoperatively, 45.0 ± 2.0 μmol/l; 2nd yr postoperatively, 42.1 ± 2.9 μmol/l; $p < 0.001$ in both cases); permanently low concentrations were recorded postoperatively in 29 of 52 patients. Patients in the low tryptophan group (i.e., < 36 μmol/l) had a higher rate of weight loss and a higher incidence of electrolyte disturbances ($p < 0.05$) and signs of liver injury ($p < 0.05$). Symptoms of depression and anxiety were slightly more common in patients with low S-tryptophan. The influence of a decreased S-albumin and a deranged amino acid pattern on the non-protein-bound fraction of S-tryptophan needs further investigation. Serum levels of tryptophan rose significantly after p.o. supplementation with 1.2 g L-tryptophan daily for 2 weeks; this dosage was insufficient to normalize a low tryptophan level in the patients who underwent jejunoileostomy.

4875 INTRAVASCULAR HEMOLYSIS, THROMBOCYTOPENIA, LEUKOPENIA, AND CIRCULATING IMMUNE COMPLEXES AFTER JEJUNAL-ILEAL BYPASS SURGERY. (Eng.) Moake, J. L.; Kageler, W. V.; Cimo, P. L.; Blakely, R. W.; Rossen, R. D.; Haesse, W. (Univ. Texas Medical Sch. at Houston, Houston, TX). *Ann. Intern. Med.* 86(5):576-578; 1977.

The case of a 25-yr-old man who developed intravascular hemolysis, thrombocytopenia, and neutropenia 2 yr after jejunoileal bypass operation for obesity is presented. The patient's RBC were coated with complement components (C4/C3) and his serum induced complement-dependent immune lysis of ^{51}Cr-labeled platelets. Serum ^{125}I-Clq binding activity (a measure of the presence of immune complexes) was increased, and serum C4 and C3 hemolytic titers were depressed. Immune complex-mediated complement activation apparently accounted for the blood cell destruction in this patient.

4876 PATTERNS OF HEPATIC MORPHOLOGY IN JEJUNOILEAL BYPASS PATIENTS. (Eng.) Peters, R. L. (John Wesley Hosp., 2826 South Hope St., Los Angeles, CA 90007). *Am. J. Clin. Nutr.* 30(1):53-57; 1977.

The close similarity of the hepatic histological pattern in jejunoileal bypass and in chronic alcoholism is described, and the case reports of three patients are presented. The most common serious hepatic complication of jejunoileal bypass is the development of acute hepatic failure. The case of a 45-yr-old woman with this complication is presented. She developed elevated bilirubin, SGOT, SGPT, and serum albumin levels within 6 months of the operation, and liver biopsies taken over the next 12 months showed progressive increase in hepatic fibrosis and hepatocellular degeneration. The symptoms improved after bowel continuity was restored. Cirrhosis may develop insidiously after the critical 8-month period following bypass. In a 34-yr-old man with this complication, a biopsy at surgery revealed fat but no fibrosis. Over 3 yr later, a routine follow-up liver biopsy showed a fatty cirrhotic liver without acute cellular degenerative changes, alcoholic hyalin, or cellular infiltration. The least common type of liver complication after jejunoileal bypass is one that is not directly related to the bypass operation but rather is further aggravated by it. A liver biopsy 2 yr following bypass in a 47-yr-old woman showed scanty perivenular fibrosis, minimal fat, and no alcoholic hyalin or cell swelling. However, the patient died 20 days later, and autopsy revealed hydropic degenerative changes, early intrasinusoidal collagen, and moderate alcoholic hyalin necrosis as well as cholestasis.

4877 BILE ACID METABOLISM IN ILEOSTOMY PATIENTS. (Eng.) Huibregtse, K.; Hoek, F.; Sanders, G. T. B.; Tytgat, G. N. J. (Dept. Medicine, Wilhelmina Gasthuis, Amsterdam, Netherlands). *Eur. J. Clin. Invest.* 7(2):137-140; 1977.

To investigate bile acid metabolism after ileostomy, ^{14}C-cholylglycine breath tests were carried out in 10 ileostomy patients, and the bile acid and fat content of the 24-hr ileostomy output were determined and compared to the values in 20 healthy controls. The average fecal fat and bile acid excretion were 1.5 g/day and 469 mg/day, resp. The mean cumulative respiratory $^{14}CO_2$ excretion within 8 hr after the administration of ^{14}C-labeled glycocholate was 1.16% (range, 0.2-0.4%); this value was significantly lower than that obtained in controls (1.9%; range, 0.2-5.0% $p<0.025$). No conjugated bile acids or secondary bile acids were detected in the ileostomy fluid in any of the patients. To study to what extent the bile acid composition in the ileostomy bags reflected its *in vivo* composition, midstream ileostomy specimens were collected from four patients and processed immediately. In these samples, a substantial quantity of bile acids was still present in the conjugated form, and after standing at room temperature in the ileostomy bags, the conjugated bile acids disappeared completely by 21 hr. The results show that colonization of the distal small intestine by a modified fecal flora in patients with ileostomy does not result in an enhanced bacterial bile acid deconjugation, and the disturbance of intestinal motility and transit time after removal of the ileocecal valve and colon does not substantially decrease the efficacy of the bile acid reabsorptive capacity of the ileum.

4878 BILE ACID METABOLISM AFTER JEJUNOILEAL BYPASS OPERATION FOR OBESITY. (Eng.) Bruusgaard, A.; Sorensen, T. I. A.; Justesen, T.; Krag, E. (Dept. Clinical Chemistry, Frederiksberg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 36(6):833-838; 1976.

Duodenal samples of bile acids and bacterial flora were taken from 12 patients before and after jejunoileal bypass operations to determine the relative responses of bile acid metabolism to two types of operative procedure. Type I bypass included 37.5 cm jejunum and 12.5 cm ileum, and type III bypass included 12.5 cm jejunum and 37.5 cm ileum. Duodenal aspirates from prefasted patients were obtained after cholecystokinin-induced (80 Ivy U) gallbladder emptying. Cholic acid turnover was estimated by isotope dilution after administration of ^{14}C-choline directly into the duodenum. The fractional daily turnover of cholic acid increased about fivefold after both types of bypass. However, the cholic acid pool size decreased significantly after the type III bypass, partially as a result of a smaller stimulation of cholic acid synthesis in this procedure. The ratios of cholic to deoxycholic acids and glycine to taurine conjugates in duodenal bile increased after type I, but not after type III, operations. Bacterial flora and the free bile acid pattern did not change significantly. The more severe disturbance of bile acid metabolism after type III bypass may result from insufficient stimulation of bile acid synthesis.

4879 PNEUMATOSIS CYSTOIDES INTESTINALIS. AN ANGIOGRAPHIC FINDING. (Ger.) von Wyttenbach, A.; Kauzlaric, D.; Pedrazzini, A. (Medizinische Abteilung, Ospedale Distrettuale, CH-6600, Locarno, Switzerland). *Fortschr. Rontgenstr.* 126 (6):560-563; 1977.

The angiographic findings of pneumatosis cystoides intestinalis of ischemic origin (PCI) in a 73-yr-old man are presented, and the pathology and etiology of PCI are briefly discussed. Initially, the patient had bloody stools. A barium enema showed typical signs of PCI, with localization in the sigmoid and splenic flexure. Signs of ischemic colitis were present in the descending colon. The patient was given conservative treatment. No clinical changes were observed 2 months later, and a barium enema showed a similar radiological picture. Abdominal angiography revealed severe atherosclerotic changes in the abdominal arteries, with hemodynamically significant stenoses at the exit of the celiac artery, a sacular aneurysm of the abdominal aorta, and occlusion of the inferior mesenteric artery. The authors stress the importance of radiological diagnosis in this disorder and recommend more angiographic studies.

4880 CELLULOSE GRANULOMAS AND THEIR RELATIONSHI TO INTESTINAL OBSTRUCTION. (Eng.) Tinker M. A.; Teicher, I.; Burdman, D. (Queens Hosp. Center 82-68 164th St., Jamaica, NY 11432). *Am. J. Surg.* 133(1):134-139; 1977.

The incidence, origin, and clinical significance of granulomatous peritonitis caused by cellulose foreign bodies were studied. Among 7,500 surgical specimens and autopsies, 45 cases of cellulose foreign body granulomas were identified by light microscopy. The patients had had at least one previous surgical procedure involving the same area. Twenty-seven cases were extraperitoneal. Eighteen were located within the peritoneal cavity, of which 5 were found at autopsy and 13 were identified at laparotomy. Two patients had granulomatous peritonitis, and six had mechanical small bowel obstruction associated with the granulomas. Among 12 surgical specimens from patients who had undergone surgery for intestinal obstruction during the study period, cellulose granulomas were detected in six, suggesting that cellulose foreign body granuloma may be a significant cause of intestinal obstruction. The 45 cases of foreign body granuloma were examined with polarization techniques and by scanning electron microscopy in an attempt to determine the source of the cellulose fibers as either cotton or wood. The origin could not be definitivel established in most cases because of loss of morphologic characteristics. However, fibers were positively identified as wood in 2 of 10 cases examined with scanning electron microscopy, which supports the theory that they were derived from disposable surgical fabrics.

4881 STUDIES OF IDIOPATHIC INTESTINAL PSEUDO-OBSTRUCTION. II. HEREDITARY HOLLOW VISCERAL MYOPATHY: FAMILY STUDIES. (Eng.) Schuffler, M. D.; Pope, C. E., II (Unites States Public Health Service Hosp., P.O. Box 3145, Seattle WA 98114). *Gastroenterology* 73(2):339-344; 1977.

Twelve relatives of a 15-yr-old girl with idiopathic intestinal pseudo-obstruction (IIPO) were studied with esophageal manometry or cine-esophagography to determine whether the disease was genetically transmitted. Four maternal relatives, including the patient's mother, 13-yr-old brother, one aunt, and one of that aunt's children, had mild dysphagia and esophageal motor dysfunction. In addition, the patient's mother and 13-yr-old brother had a flaccid bladder and bilateral ureteral reflux, resp. The brother had abnormal bladder smooth muscle by light microscopy; marked fibroses separating abnormal smooth muscle cells were present. It is concluded that IIPO in this family is secondary to a generalized disease of smooth muscle that is transmitted as a dominant trait of variable expressivity. It is manifested in some family members as a mild disorder of esophageal smooth muscle dysfunction and at times is accompanied by bladder dysfunction. The authors suggest that this form of IPPO be called "hereditary hollow visceral myopathy." Esophageal manometry may be useful for studying the inheritance of this disorder.

4882 COMMON BILE DUCT OPENING INTO A DUODENAL DIVERTICULUM. (Ger.) Mall, K.; Schmidt, M. (Krankenhaus Moabit, Turmstrasse 21, 1000 Berlin 21, W. Germany). *Fortschr. Roentgenforsch.* 125(5):474-475; 1976.

4883 ENDOSCOPIC PAPILLOTOMY IN PATIENTS WITH JUXTAPAPILLARY DUODENAL DIVERTICULA [Abstract]. (Eng.) van Husen, N.; Safrany, L.; Kautz, G. (Medical Univ. Clinic, Munster, W. Germany). *Endoscopy* 9(2):116-117; 1977.

4884 IS DUODENITIS A DYSPEPTIC MYTH [Abstract]? (Eng.) Joffe, S. N.; Thomson, W. O.; Robertson, A.; Lee, F.; Blumgart, L. H. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A399; 1977.

4885 DUPLICATIONS OF THE INTESTINAL TRACT: CLINICAL AND RADIOLOGICAL FEATURES. (Eng.) Tschappeler, H.; Smith, W. B. (Inselspital, CH 3010 Bern, Switzerland). *Ann. Radiol.* 20(1):133-139; 1976.

4886 PRIMARY ADENOCARCINOMA OF THE DUODENUM. (Eng.) Spira, I. A.; Ghazi, A.; Wolff, W. I. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Cancer* 39(4):1721-1726; 1977.

4887 VILLOUS TUMORS OF THE DUODENUM. (Eng.) Spira, I. A.; Wolff, W. I. (Beth Israel Medical Center, 10 Nathan D. Perlman Place, New York, NY 10003). *Am. J. Gastroenterol.* 67(1):63-68; 1977.

4888 MALIGNANT TUMORS OF THE JEJUNUM AND ILEUS. (Ita.) Bazzocchi, R.; Capizzi, F. D.; Alonzo, A.; Cavaliere, F.; Abo-Rahmy, E. (I Clinica Chirurgica e Terapia Chirurgica dell'Universita degli Studi di Bologna, Bologna, Italy). *Acta. Chir. Ital.* 33(2):200-214; 1977.

4889 TUMORS OF THE SMALL INTESTINE PRESENTING AS ACUTE ABDOMINAL EMERGENCIES (3 CASES). (Ita.) De Bernardis, F.; Binda, R. (Servicio di Pronto Soccorso e Chirurgia d'Urgenza dell'Ospedale Generale Provinciale di Cittadella, Padua, Italy). *Acta. Chir. Ital.* 33(1):136-149; 1977.

4890 PROCEDURE AND RESULTS IN EARLY POST-OPERATIVE ILEUS. (Ger.) Kapral, W. (Chirurg. Abteilung Allg. offentl. Krankenhaus A-3390 Melk). *Aktuelle Chir.* 12(2):117-126; 1977.

4891 MASSIVE INTESTINAL RESECTION IN INFANCY AND CHILDHOOD. (Spa.) Ben, R. A.; Garcia, H. (Policlinico A. Posadas, Martinez de Hoz y Marconi, Haedo, Buenos Aires, Argentina). *Arq. Gastroenterol.* 14(1):45-51; 1977.

4892 ILEOSTOMY COMPLICATIONS REQUIRING REVISION: LAHEY CLINIC EXPERIENCE, 1964-1973. (Eng.) Goldblatt, M. S.; Corman, M. L.; Haggitt, R. C.; Coller, J. A.; Veidenheimer, M. C. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Dis. Colon Rectum* 20(3):209-214; 1977.

4893 SURGICAL TREATMENT OF OBESITY BY JEJUNO-ILEAL BYPASS. (Ger.) Goral, R.; Tuszewski, M. (Chirurgisches Institut der Medizinischen Akademie, 60-355 Poznan, Poland). *Zentralbl. Chir.* 102(6):337-345; 1977.

4894 INFLUENCE OF JEJUNOILEOSTOMY ON THE LIPID FRACTIONS IN MORBIDLY OBESE PATIENTS. (Ger.) Tuszewski, M.; Smolinska, K. (Gastroenterologische Klinik des Chirurgischen Instituts der Medizinischen Akademie, 60-355 Poznan, Poland). *Zentralbl. Chir.* 102(6):346-350; 1977.

4895 LIVER FUNCTION AND SERUM CONCENTRATION OF ELECTROLYTES IN PATIENTS OPERATED FOR MORBID OBESITY. (Ger.) Tuszewski, M.; Woszczyk, J.; Ruszkowska, J. (Gastroenterologische Klinik des Chirurgischen Instituts der Medizinischen Akademie, 60-355 Poznan, Poland). *Zentralbl. Chir.* 102(6):351-356; 1977.

4896 COMPLICATIONS AFTER JEJUNOILEAL SHUNT IN THE TREATMENT OF EXTREME OBESITY. (Ger.) Husemann, B.; Mrozek, B.; Rettinger, W. (Oberarzt der Chir. Univ.-Klinik, Maximiliansplatz, 825 Erlangen, W. Germany). *Fortschr. Med.* 95(25):1644-1652; 1977.

4897 OBESITY--BYPASS OPERATION--JUSTIFIED OR NONSENSE? (Ger.) Labhart, A. (Departement fur innere Medizin, Kantonspital, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(14): 453-455; 1977.

4898 NON-NEOPLASTIC ASPECIFIC PERFORATION OF THE SMALL INTESTINE. CLINICAL PROBLEMS AND CLASSIFICATION DIFFICULTIES. (A RARE CASE OF MULTIPLE ULCERATION OF THE ILEUM AFTER APPENDECTOMY. (Ita.) Cardona, G.; Panichi, S. (Chirurgia d'Urgenza dell'Universita degli Studi di Firenze, Florence, Italy). *Acta Chir. Ital.* 33(2):266-282; 1977.

4899 HISTOLOGICAL AND ULTRA-MICROSCOPIC ASPEC OF THE SMALL INTESTINE IN AREGENERATIVE ENTEROPATHIES WITH ALPHA-MERCAPTOPROPIONYL-GLYCINE (Ita.) Labo, G.; Gasbarrini, G.; Barbara, L.; Fontana, G.; Corazza, G. R. (SS. Annunziata United Hosp., Chieti, Italy). *Minerva Med.* 68(36): 2491-2498; 1977.

4900 *Yersinia* ENTERITIS AND CROHN'S DISEASE [Letter to Editor]. (Eng.) Barry, R. E Lobban, D. I. (Bristol Royal Infirmary, Bristol, England). *Br. Med. J.* 2(6083):387; 1977.

See also, 4697, 4698, 4712, 4720, 4726, 4727, 4728
4738, 4739, 4740, 4743, 4757, 4758, 4763
4800, 4814, 4816, 4831, 4842, 4914, 4924
4936, 4953, 5073, 5169, 5173, 5178, 5180
5182, 5183, 5186, 5196, 5212, 5214, 5215
5223, 5233, 5240.

SMALL INTESTINE

Malabsorption

4901 ANEMIA AND INTESTINAL DYSFUNCTION IN FORMER RESIDENTS OF THE CARIBBEAN. (Eng.) Meyers, S.; Schweitzer, P.; Gerson, C. D. (U.S. Walson Army Hosp, Fort Dix, NJ 08640). *Arch. Intern. Med.* 137(2):181-186; 1977.

The problem of differentiating pernicious anemia from tropical sprue in five patients with megaloblastic anemia, vitamin B_{12} deficiency, normal or elevated serum folate levels, and small intestinal dysfunction is discussed. All of the patients were natives of the Caribbean area living in New York City. Achlorhydria, serum anti-intrinsic factor antibody, the severity of small intestinal abnormalities, and post-therapy Schilling tests were helpful in differentiating two patients with pernicious anemia from three with tropical sprue. Achlorhydria was present in the two anemic patients and was not present in two patients with tropical sprue that were tested. Similar results were obtained for anti-intrinsic factor antibody. Post-therapy Schilling test values (without intrinsic factor) were normal (greater than 8%) in the three tropical sprue patients, being 9.1, 13.8, and 8.8%, resp.; in the two anemic patients, these values were 0.1 and 0.50%, resp. Folate levels were within the normal range (5-15 ng/ml) in the two anemic patients, but were elevated in two of the three tropical sprue patients (33.3 and 20 ng/ml, resp.). Abnormalities in jejunal morphology were more dramatic in tropical sprue patients. Dilation of the proximal jejunum was seen in each patient with tropical sprue, whereas in pernicious anemia, small intestinal barium studies were normal.

4902 GLIADIN-INDUCED MIGRATION INHIBITION OF PERIPHERAL LEUKOCYTES BY THE AGAROSE-PLA TECHNIQUE IN PATIENTS WITH CELIAC DISEASE. (Ger.) Douwes, F. R.; Lippmann-Nielsen, I.; Hanke, R. (Me izinische Klinik und Poliklinik der Universitat, Humboldtallee 1, 3400 Gottingen, W. Germany). *Dts Med. Wochenschr.* 102(19):721-724; 1977.

Sensitization to gliadin (100 µg/ml) was studied b the modified leukocyte migration inhibition test i 10 patients with celiac disease (CD), 9 with ulcerative colitis (5 receiving salazosulfapyridine), 9 with terminal ileitis (3 were receiving salazosulfapyridine), 9 with bacterial diarrhea (all were receiving antibiotics), 8 with duodenal and ventricular ulcer, 2 with chronic recurrent pancreatitis, and 4 with colon carcinoma. Following preparation of the leukocyte suspension, 8.0 µl was placed on agar plates with gliadin (10-600 µg/ml) and incubated in a humidity chamber at 37 C for 18 hr, after which time the migration index (MI) was calculated. Patients with CD had a mean MI of 0.72 ± 0.06 (control=1.04 ± 0.11), whereas other patients had a significantly higher MI (0.98-1.13). A quantitative study of the inhibition of migration in five patients with CD showed a close correlation between the MI and the concentration of gliadin that caused inhibition; inhibition was optimum at 100 μg/l. Above 500 μg/ml the viscosity of the medium was so changed that even normal cells could no longer migrate, which indicated that at these concentrations, the function impairment was not induced by soluble lymphokines, but by the antigen and its chemical properties. The positive T-cell response could be abolished by pretreatment of lymphocytes with puromycin (20 μg/ml). After incubation, no active synthesis of MI factor was observed, and leukocytes migrated freely in the agarose, even in the presence of the antigen. The results suggest that cellular immune mechanisms play a role in CD.

4903 A NEW EXPERIMENTAL SYSTEM FOR THE STUDY OF THE PATHOGENESIS OF COELIAC DISEASE.

(Eng.) Hudson, D. A.; Anderson, C. M.; Cooper, B. T. (Dept. Pediatrics and Child Health, Univ. Birmingham, Birmingham, England). *Lancet* 1(8010):511-512; 1977.

A method for the differential removal of epithelial cells from human intestinal tissue specimens is described, and this method was applied to jejunal biopsy specimens from controls and patients with celiac disease. A phosphate-buffered citrate solution (pH 7.4) is used to pretreat the tissue for 15 min before release of the epithelial cells by mechanical agitation. This procedure was usually sufficient to remove all villous epithelial cells, but not the crypt cells; the latter could be removed by a second 15-min incubation ending with further mechanical treatment. Differential removal of epithelial cells from "flat" biopsy specimens from subjects with celiac disease was achieved without modification of this procedure. The epithelial cells were largely released as sheets or aggregations. Dispersal of these sheets revealed that the separated cells retained their characteristic shape with a distinct, regular brush border and basal nucleus. Trypan blue dye exclusion tests indicated that a minimum of 60% of the cells were viable, although in most specimens viability approached 90%. Short-term survival in defined media confirmed the viability. RBC was the major cellular contaminant of the enterocyte suspensions and could be readily removed by centrifugation through a buffered solution of a "Ficoll"/"Triosil" mixture. This system can be used to investigate the differential cytotoxic effects of specific gluten components upon cells from normal subjects and celiac patients.

4904 COELIAC DISEASE WITH MILD MUCOSAL ABNORMALITIES: A REPORT OF FOUR PATIENTS.

(Eng.) Scott, B. B. Losowsky, M. S. (St. James' Hosp., Leeds LS9 7TF, England). *Postgrad. Med. J.* 53(617):134-138; 1977.

Small intestinal biopsies that were neither normal nor completely flat, as found in classical celiac disease, were detected in 17 of 123 patients with suspected malabsorption. In 6 of these 17 patients, there was no apparent cause for the mild mucosal abnormality. Four of these patients were treated with a gluten-free diet, and all responded morphologically and symptomatically. Each of these four patients had jejunal biopsies before treatment that were convoluted, as well as ridged in one case; after treatment, the biopsies were villous. In one case, the patient was given p.o. iron and i.m. vitamin B_{12} simultaneously with the gluten-free diet; the possibility must be considered that the response may have been due to these hematinics rather than to the gluten-free diet. It is concluded that at least three of these four patients had celiac disease in a mild form and that a classical flat biopsy is not a prerequisite for the diagnosis of celiac disease. It is suggested that the criterion for the diagnosis of celiac disease should be the demonstration of an unequivocal improvement of any mucosal abnormality in response to a gluten-free diet or deterioration in response to gluten.

4905 HLA ANTIGEN IN CHILDREN WITH CELIAC DISEASE AND IN CHILDREN WITH INTOLERANCE TO COW'S MILK PROTEINS.

(Fre.) Mougenot, J. F.; Hors, J.; Schmid, M.; Cathelineau, L.; Navarro, J.; Polonovski, C. (Hopital Trousseau, 26, ave. du Dr.-Arnold-Netter, F-75012 Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7):507-514; 1977.

The HLA phenotype of 53 children with celiac disease and of 39 children with intolerance to cow's milk proteins was determined. A microlymphocytotoxicity technique was used to identify 28 alleles at the A and B loci. The distribution of HLA antigens in the patients with cow's milk intolerance was not significantly different from that in normal controls. Of the 38 European patients with celiac disease, 58% had HLA-B8, compared to 17% of European controls. The 15 North African children with celiac disease showed an HLA-B8 frequency of 33%, while normal North Africans were 12% positive. This corresponds with the decrease in frequency of the B8 allele from Northern Europe to Southern Europe to North Africa. This study confirms that the gene complex coding for gluten intolerance is strongly, but not invariably, linked with the B8 locus.

4906 THE ASSOCIATION OF HL-A-B8 AND CHILDHOOD CELIAC DISEASE IN AN ISRAELI POPULATION.

(Eng.) Gazit, E.; Avigad, S.; Zfat, Z.; Efter, T.; Mizrachi, Y.; Rotem, Y. (Chaim Sheba Medical Center, Tel-Hashomer, Israel). *Isr. J. Med. Sci.* 13(4):400-404; 1977.

The frequency of histocompatibility antigens (HL-A) was studied in 33 Israeli children with celiac disease to detemine if HL-A-B8 is associated with celiac disease in Middle Eastern populations (in which the frequency of this antigen is low). HL-A-B8 phenotype was detected in 27.3% of the celiac patients and 7.5% of 395 matched controls (χ^2 for heterogeneity=14.23, $p<10^{-4}$). HL-A typing, especially in children, is advocated both as a diagnostic and a prognostic measure.

4907 DIGESTIVE INTOLERANCE TO COW'S MILK PROTEIN IN THE INFANT. CLINICAL STUDY OF 15 CASES.

(Fre.) Marie, F.; de Menibus, C. H.; LeDosseur, P.; Mallet, E.; Tron, P. (Hopital Charles Nicolle, bd. Gambetta, 76038 Rouen Cedex, France). *Ann. Pediatr. (Paris)* 24(5):383-387; 1977.

Transient intolerance to cow's milk was reported in 15 infants (11 boys, 4 girls), aged 15-80 days. The chief manifestations of the intolerance were weight loss (15 infants), diarrhea (14), vomiting (13), fever (3), and allergy (4, erythema or urticaria). Of the 15 infants, 5 had a familial history of intolerance to cow's milk. The intolerance usually developed very early but in one case it occurred at the age of 68 days. Seven infants went into shock when milk was reintroduced 13-70 days after its exclusion. The infants became pale and developed tachycardia; a drop in arterial pressure associated with vomiting, diarrhea, and dehydration also occurred. In one instance it was accompanied by an urticarial reaction. However, all symptoms of intolerance disappeared gradually when milk was reintroduced 7-14 months later. Systemic jejunal biopsies were not performed due to the young ages and poor condition of the infants. The lymphocyte transformation test was negative in all children.

4908 SOY PROTEIN INTOLERANCE: FOUR PATIENTS WITH CONCOMITANT COW'S MILK INTOLERANCE.

(Eng.) Whitington, P. F.; Gibson, R. (Univ. Wisconsin, Center Health Sciences, 1300 University Ave., Madison, WI 53706). *Pediatrics* 59(5):730-732; 1977.

Four infants with intractable diarrhea due to soy protein intolerance are reported. Each patient developed diarrhea in the first month of life on a cow's milk formula. The diarrhea was unresponsive to dietary management with a soy protein-based formula. Malnutrition was the most prominent feature, and dehydration was also common. The diagnosis of soy protein intolerance was confirmed by challenge with soy protein isolate (200 mg or 2 g), which resulted in diarrhea, vomiting, fever, lethargy, and pale, mucoid stools. Vomiting usually occurred within 15 min of challenge and the diarrhea never persisted past 12 hr after challenge. One patient developed hypotension. Concomitant cow's milk sensitivity was confirmed in each patient by challenge with skimmed milk after documentation of lactose tolerance. A diet devoid of intact soy and cow's milk (a sucrose-casein hydrolysate formula) was well-tolerated in all patients and resulted in rapid weight gain. Oral disodium cromoglycate therapy was ineffective in one trial. Soy protein intolerance should be suspected in infants with diarrhea resistant to therapy with soy based formulas.

4909 MINIMAL BILE ACID MALABSORPTION AND NORMAL BILE ACID BREATH TESTS IN CYSTIC FIBROSIS AND ACQUIRED PANCREATIC INSUFFICIENCY.

(Eng.) Roller, R. J.; Kern, F., Jr. (Univ. Colorado Medica Center, 4200 East 9th Ave., Denver, CO 80220). *Gastroenterology* 72(4):661-665; 1977.

To confirm previous reports that fecal bile acid excretion is increased in children with cystic fibrosis, 1-^{14}C-cholylglycine breath tests were carried out in patients with cystic fibrosis and acquired pancreatic insufficiency, and the fecal bile acid and fat excretion were determined. The patients included 8 cystic fibrosis patients, 10 patients with ileal resections, 9 patients with acquired pancreatic insufficiency, 10 controls wit diarrhea, and 11 healthy subjects. Studies were done when patients were taking pancreatic enzymes (Cotazym) and also when no medication was given. $^{14}CO_2$ excretion in breath was normal in patients with acquired pancreatic insufficiency (normal= 0-4.97% in diarrhea and in healthy controls). $^{14}CO_2$ excretion was significantly lower in the cystic fibrosis patients ($p<0.05$), both with and without Cotazym therapy. Fecal bile acid excretio was slightly elevated in both groups without Cotazym and became normal with Cotazym in patients with acquired pancreatic insufficiency. Steatorrhea was present in both patient groups and improved during Cotazym therapy. Bile acid malabsorption in cystic fibrosis and in acquired pancreatic insufficiency is minimal and probably not clinically important.

4910 BILE ACID MALABSORPTION--A CONSEQUENCE O TERMINAL ILEAL DYSFUNCTION IN PROTRACTED DIARRHEA OF INFANCY.

(Eng.) Balistreri, W. F.; Partin, J. C.; Schubert, W. K. (Univ. Cincinnati Coll. Medicine, Cincinnati, OH). *J. Pediatr.* 89(1 21-28; 1977.

Fecal labeled bile acid excretion was measured in two infants with protracted diarrhea and in contro in order to determine if bile acid malabsorption w responsible for the diarrhea. The controls includ four infants who had undergone ileal resection, fo patients with steatorrhea due to pancreatic or mucosal defects not involving the ileum, and five patients with mild-to-moderate chronic diarrhea but without steatorrhea. The mean fecal excretion of ^{14}C-24-cholic acid in the patients with protracted diarrhea (44.5 ± 13.5%/24 hr) and in the patients who underwent ileal resection (37.8 ± 12.8%) was significantly increased in comparison with that in the patients with steatorrhea (7.5 ± 2.9%) or in those with chronic diarrhea (4.8 ± 1.0%). The rat of mean 24-hr excretion of bile acid to that of a nonabsorbable marker (polyethylene glycol) confirmed the malabsorption of bile acid in the patie with intractable diarrhea or ileal resection; thes results differed significantly ($p<0.05$) from excretion ratios obtained in patients with either steatorrhea or chronic diarrhea. The extent of bile acid loss was not related to the rate of feca fat excretion. There was no direct correlation of fecal weight with the rate of bile acid excretion. The Schilling test of ileal function was abnormal (<1.0% excretion/24 hr) in both the protracted diarrhea and ileal resection patients, whereas it was normal in the other two groups. The results suggest that bile acid malabsorption was involved in the pathophysiology or prolongation of diarrhea in these two infants.

4911 MALABSORPTION IN RELATION TO ABDOMINAL IRRADIATION AND QUADRUPLE CHEMOTHERAPY FOR LYMPHOSARCOMA. (Eng.) Scarpello, J. H. B.; Sladen, G. E. (Royal Hosp., West St., Sheffield S1 3SR, England). *Postgrad. Med. J.* 53(618):209-221; 1977.

The case of a patient with bile acid malabsorption following chemotherapy and abdominal irradiation for lymphosarcoma is reported. The patient, a 58-yr-old man, experienced temporary watery diarrhea after he underwent three courses of chemotherapy (nitrogen mustard, 7.5 mg; vincristine, 2.0 mg, i.v., days 1 and 8; procarbazine, 50 mg b.i.d.; and prednisolone, 10 mg t.i.d., p.o. for 2 weeks) and one course of irradiation (800 rad to the abdomen) for the treatment of stage IV lung and pleural lymphosarcoma. His symptoms commenced during radiotherapy and resolved shortly thereafter. He had remained well and in clinical remission for 9 months when he experienced acute abdominal pain, watery diarrhea, and steatorrhea. The fecal fat averaged 56 mmol/day (normal <21), and fecal bile acids were 3,477 and 2,578 μmol/24 hr on two occasions (normal <880). The patient responded to a low fat diet and treatment with cholestyramine; the patient remains well on this regimen 2.5 yr after the onset of diarrhea, and chemotherapy has been continued. A questionnaire was sent to 32 subjects who had undergone similar treatment for similar pathology; it failed to demonstrate any sustained alteration of bowel function. In addition, nine of these subjects underwent a ^{14}C-glycocholic acid test, and no evidence of interruption of the enterohepatic circulation of bile acids was found. Bile acid malabsorption appears to be a very unusual complication of treatment for cancer and has not been previously reported.

4912 MORPHOLOGICAL STUDY OF SOME TYPES OF ANTRODUODENAL ENDOCRINE CELLS IN CASES OF PRIMARY AND SECONDARY MALABSORPTION SYNDROMES [Abstract]. (Eng.) Gasbarrini, G.; Bonvicini, F.; Corazza, G. R.; Miglio, F.; Ionata, R. (Istituto do Patologia Speciale Medica dell'Universita, Chieti e III Cattedra di Patologia Speciale Medica dell' Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):58-59; 1977.

4913 INTESTINAL ABSORPTION IN RELATION TO NUTRITION IN OLD AGE [Abstract]. (Eng.) Montgomery, R. D.; Ross, I. N.; Haeney, M. R.; Sammons, H. G.; Barford, A. V.; Culank, L. S. (East Birmingham Hosp., Birmingham, England). *Gut* 18(5):A427; 1977.

4914 HLA-DW6 AND AVIAN HYPERSENSITIVITY [Letter to Editor]. (Eng.) Berrill, W. T.; van Rood, J. J. (Northern Counties Chest Hosp., Newcastle upon Tyne NE4 6SQ, England). *Lancet* 2(8031):248-249; 1977.

4915 IMPROVED FAT ABSORPTION WITH SYNTHETIC DETERGENTS IN PATIENTS WITH BILE SALT DEFICIENCY [Abstract]. (Eng.) King, R. F. G. J.; Kelleher, J.; Howdle, P. D.; Hall, G. P.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 18(5):A426; 1977.

4916 ENDOSCOPIC DYE-SCATTERING IN COELIAC DISEASE [Abstract]. (Eng.) Stevens, F. M.; McCarthy, C. F. (Regional Hosp., Galway, Ireland). *Gut* 18(5):A398; 1977.

4917 ISOLATING THE COMPONENT OF GLUTEN WHICH CAUSES THE MUCOSAL DAMAGE IN COELIAC DISEASE [Abstract]. (Eng.) Anand, B. S.; Offord, R. E.; Piris, J.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 18(5):A408; 1977.

4918 SPECIFIC IMMUNOFLUORESCENCE AND IMMUNOPEROXIDASE REACTIONS IN THE JEJUNAL MUCOSA OF COELIAC SUBJECTS AFTER CHALLENGE WITH A FRACTION OF GLUTEN [Abstract]. (Eng.) Anand, B. S.; Offord, R. E.; Piris, J.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 18(5):A408; 1977.

4919 B-CELL ANTIGENS IN COELIAC DISEASE (GLUTEN-SENSITIVE ENTEROPATHY) [Abstract]. (Eng.) Pena, A. S.; Mann, D. L.; Hague, N. E.; Heck, J.; Van Leeuwen, A.; Van Rood, J. J.; *et al.* (Natl. Cancer Inst., Bethesda, MD). *Gut* 18(5):A409; 1977.

4920 EVIDENCE FOR MUCOSAL IMMUNE COMPLEXES IN UNTREATED COELIAC DISEASE [Abstract]. (Eng.) Scott, B. B.; Scott, D. G.; Losowsky, M. S. (Dept. Medicine, Univ. Leeds, Leeds, England). *Gut* 18(5):A409-A410; 1977.

4921 IMMUNOBLASTS IN COELIAC DISEASE [Abstract]. (Eng.) O'Donoghue, D. P.; Sewell, R.; Hall, J.; McGeehan, S.; Clark, K. L.; Kumar, P. J. (St. Bartholomew's Hosp., London, England). *Gut* 18(5):A409; 1977.

4922 PERIPHERAL BLOOD LYMPHOCYTE SUBPOPULATIONS IN ADULT COELIAC DISEASE (CD) [Abstract]. (Eng.) Bullen, A. W.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 18(5):A408-A409; 1977.

4923 FOLATE DEFICIENCY AND DNA SYNTHESIS OF JEJUNAL MUCOSA IN TROPICAL MALABSORPTION

(TM) [Abstract]. (Eng.) Tomkins, A. M.; McNurlan, M.; Wright, S. (London Sch. Hygiene and Tropical Medicine, London, England). *Gut* 18(5):A408; 1977.

4924 ENTEROBACTERIAL COLONISATION OF ILEUM WITH VITAMIN B_{12} MALABSORPTION MEASURED BY WHOLE BODY COUNTING TECHNIQUES IN TROPICAL MALABSORPTION (TM) [Abstract]. (Eng.) Tomkins, A. M.; Wright, S. G.; Smith, T.; Drasar, B. S. (London Sch. Hygiene and Tropical Medicine, Northwick Park, Har England). *Gut* 18(5):A407; 1977.

See also, 4510, 4578, 4732, 4743, 4744, 4866, 48
4874, 4878, 4896, 4963, 5065, 5191, 51
5199, 5210, 5242.

LARGE INTESTINE

4925 WHOLE GUT IRRIGATION: AN INADEQUATE PREPARATION FOR DOUBLE CONTRAST BARIUM ENEMA EXAMINATION. (Eng.) Bakran, A.; Bradley, J. A.; Bresnihan, E.; Lintott, D.; Simpkins, K. C.; Goligher, J. C.; Hill, G. L. (General Infirmary, Leeds LS1 3EX, England). *Gastroenterology* 73(1):28-30; 1977.

Since the method of whole gut irrigation has been claimed to be very effective and convenient in preparing the colon for surgery, its efficacy in the preparation of the bowel for double contrast barium enema examination was assessed in 20 outpatients of similar age, sex distribution, and symptomatology. The patients presented for barium enema examination by a modification of the Malmo double contrast technique, and were randomly allocated to two groups. The "normal" preparation group ate a restricted diet and took a laxative the day before. Immediately before the examination the colon was washed out using colonic lavage. The "irrigation" group omitted the laxative. The colon was cleansed with warmed isotonic saline that was infused down a nasogastric tube until the effluent was clear or 10-12 l had been infused. The average amount infused was 10.5 ± 1.1 l over a mean time of 1.64 ± 0.2 hr. The examinations were performed by one radiologist. Three radiologists (without knowledge of the preparation used) independently assessed all radiographs according to the amount of water and feces remaining, the quality of mucosal coating, the amount of barium present, and terminal ileum filling. When the results of the three radiologists were pooled, mucosal coating and definition were found to be significantly worse in the irrigated patients ($p<0.025$ Mann-Whitney u-test). There were also significant increases in residual water, amount of barium present in the colon, and terminal ileum filling ($p<0.05$) in the irrigated patients, although no difference was noted in the amount of residual feces. Whole gut irrigation is not a satisfactory preparation for double contrast barium enema examination.

4926 AN ULTRASTRUCTURAL STUDY OF OSMIOPHILI IN THE HUMAN RECTUM. (Eng.) Levison, A.; Pennington, C. R.; Hopwood, D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Hist chem. J.* 9(1):77-88; 1977.

Rectal biopsies taken 7 cm above the anal margin from 24 patients with various forms of inflammat bowel disease (9 with ulcerative colitis, 3 with Crohn's disease, and 12 with diarrhea) and from 3 patients with a normal rectum were studied by a prolonged osmication technique. No consistent ultrastructural differences were observed betwee these groups. However, there were striking diffe ences between individual epithelial cells in the same biopsy and between the epithelium and cells of the lamina propria. The Golgi apparatus was demonstrated occasionally in the epithelium and often in the endothelium. Endoplasmic reticulum, perinuclear cisterna, and mitochondria were vari outlined. Striking variations were seen in the deposition of osmium in the endoplasmic reticulu of plasma cells. The underlying mechanism of the different staining patterns is not clear. The findings do not appear to help in the differenti diagnosis of inflammatory bowel disease and do n shed any new light on the underlying pathogenic mechanisms.

4927 CHARACTERIZATION OF A HYPERACTIVE SEGM AT THE RECTOSIGMOID JUNCTION. (Eng.) Chowdhury, A. R.; Dinoso, V. P.; Lorber, S. H. (Dept. Gastroenterology, Temple Univ. Hosp., 340 N. Broad St., Philadelphia, PA 19140). *Gastroent ology* 71(4):584-588; 1976.

Motor wave activity of the colon and rectum was studied in 39 patients with motor disorders of th colon and in 12 controls to investigate the hyper activity at the rectosigmoid junction observed with chronic constipation. Subjects fasted overnight and were given an enema 1 hr before each test. Intraluminal pressure at various levels near the junction was monitored by a triple lumen tube assembly introduced through a sigmoidoscope. Respiration was monitored simultaneously. Hyperactive segments, identified by continuous complex wave activity or superimposed repeated waves, were 1.5-2 cm long and 9-15 cm from the anal verge. The hyperactive segments were not affected by i.v. secretin or cholecystokinin. However, atropine sulfate and glucagon inhibited the hyperactive segments significantly, suggesting that the abnormal activity may be due to continuous discharge of a neurotransmitter that stimulates the muscarinic effector cells. Persistent hyperactivity was observed in 75% of the patients with chronic constipation, including 8/10 patients with irritable colon and 4/5 patients with colonic diverticulosis. Hyperactivity was not present in the controls, and it was observed in only 1/15 patients with colon disorders who were not suffering from chronic constipation. These studies suggest that hyperactivity at the rectosigmoid junction may be either a cause or effect of chronic constipation, but not an effect of any underlying disorder.

4928 APPROACH TO SCREENING AND DIAGNOSIS IN COLORECTAL CANCER. (Eng.) Winawer, S. J.; Sherlock, P. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Semin. Oncol.* 3(4):387-397; 1976.

The screening and diagnosis of colorectal cancer are discussed. Persons with previous history of colon polyps or colon cancers are at highest risk for a new colon cancer within 5 yr of the index cancer and should have a repeat air-contrast barium enema and a colonoscopy to clear the colon thoroughly of additional lesions at 2 months after initial treatment. Following these procedures, they should be reexamined thoroughly every 2-3 yr and have Hemoccult slide-testing and sigmoidoscopy done annually. Patients with underlying premalignant colon diseases such as ulcerative colitis, granulomatous colitis, and any one of the genetically acquired polyposis syndromes must be followed, primarily by endoscopic and cytological techniques. Radiologic examinations can supplement these. Sigmoidoscopy, with rectocolonic cytological lavage, should be done every 6 months and colonoscopy with cytological lavage once a year in the asymptomatic patient with polyposis or ulcerative colitis. Following any subtotal resection, frequent sigmoidoscopy with cytological lavage is important. Patients with family histories of single or multiple primary colon cancers or multiple carcinomas in different anatomic sites and relatives of patients with polyposis syndromes or juvenile polyps should have an annual sigmoidoscopy and Hemoccult slide testing. If the latter is positive, they should have barium enema with air contrast, followed by colonoscopy for complete evaluation of the colon. Periodic screening should probably begin by the age of 20 yr. If these patients are shown to have developed the polyposis syndromes, they must be followed more aggressively, as suggested for patients with underlying premalignant diseases. Asymptomatic persons over the age of 40 yr should be screened in the same manner as asymptomatic patients with significant family histories. Any patient with a positive Hemoccult slide test and no demonstrated colon pathology should have an upper gastrointestinal and small bowel series done.

4929 TRITIATED THYMIDINE INCORPORATION INTO EPITHELIAL CELLS OF NORMAL-APPEARING COLORECTAL MUCOSA OF CANCER PATIENTS. (Eng.) Maskens, A. P.; Deschner, E. E. (Hopital Universitaire St. Pierre, B 3000, Louvain, Belgium). *J. Natl. Cancer Inst.* 58(5):1221-1224; 1977.

A radioautographic analysis of the number and position of labeled epithelial nuclei after *in vitro* incorporation of tritiated thymidine ([^{3}H]TDR) was carried out with 30 specimens of histologically normal colorectal mucosa from 13 patients with rectal or sigmoid cancer and 13 controls. A higher mean labeling index was found in the cancer than in the control group (9.8% ± 1.2 and 7.9% ± 0.9, resp.). Because of wide individual variations, this difference was not statistically significant. However, a highly significant upward shift of the proliferating cell compartment was observed in the cancer group, resulting in a specific modification of the [^{3}H]TDR labeling pattern in 6 of 17 specimens. DNA synthesis predominated in the middle or middle and upper thirds of the crypts of Lieberkuhn, rather than in the lower third as observed in controls. The patchy alteration of epithelial cell renewal frequently accompanying colorectal cancer suggested a defect in the regulatory control mechanism. This *in vitro* [^{3}H]TDR incorporation assay could provide a valuable discriminatory parameter in studies of high-risk populations.

4930 HYDROLYTIC ENZYMES IN COLORECTAL CANCER. (Eng.) Double, J. A.; Cooper, E. H.; Goligher, J. C. (Dept. Experimental Pathology and Cancer Res., Univ. Leeds, Leeds LS2 9NL, England). *Biomedicine* 27(1):11-13; 1977.

The activities of five hydrolytic enzymes, sulfatase A/B, sulphatase C, β-glucuronidase, acid phosphatase, and alkaline phosphatase, were measured in 22 patients with metastatic colorectal cancer and in 16 patients treated for colorectal cancer with no evidence of recurrence. The mean activities of sulfatase A/B, sulphatase C, β-glucuronidase, acid phosphatase, and alkaline phosphatase among all 38 patients were 0.30 ± 0.29, 7.48 ± 4.70, 2.89 ± 2.46, 51.20 ± 19.49, and 25.59 ± 14.92 μmol substrate hydrolyzed/min/g protein, resp.; the corresponding ranges were 0.09-1.64, 0.32-21.20, 0.48-11.10, 7.30-101.30, and 1.30-69.60 μmol/min/g, resp. There were no significant differences between the enzyme activities in patients with metastatic tumors and in patients with localized tumors. It is concluded that there are wide variations in the levels of hydrolytic enzymes in colorectal cancer. There are patients who might benefit from treatment with tailor-made enzyme activated anti-tumor agents.

4931 UNDESCRIBED TOXIN IN PSEUDOMEMBRANOUS COLITIS.

(Eng.) Larson, H. E.; Parry, J. V.; Price, A. B.; Davies, D. R.; Dolby, J.; Tyrrell, D. A. J. (Northwick Park Hosp. and Clinical Res. Center, Harrow, Middlesex HA1 3UJ, England). *Br. Med. J.* 1(6071):1246-1248; 1977.

The etiology of pseudomembranous colitis was studied in a 12-yr-old girl who developed colitis after a short course of p.o. penicillin and in five other patients with pseudomembranous colitis. The patient experienced intermittent colicky abdominal pain, diarrhea, and vomiting after she had taken 16, 250-mg doses of phenoxymethylpenicillin over 4 days. She had no history of adverse reaction to the antibiotic before or after the illness. Conventional scratch, intradermal, and patch skin tests with benzylpenicillin and with a solution made from the patient's own tablets gave negative results. Electron microscopy of negatively stained grids prepared from ultracentrifuged and immune-precipitated stool suspension failed to show virus particles, but thin sections of colonic exudate fixed in Karnovsky's fixative did show spherical, membrane-bound, virus-like particles of 40-nm in diameter. Although no pathogenic bacteria, mycoplasmas, or viruses were found in the patient's feces, a toxin was found in tissue cultures inoculated with fecal suspensions. Its cytopathic effect had a characteristic pattern, occurring diffusely and simultaneously throughout the cell sheet, progressing to a maximum at 48 hr. Cells became rounded and refractile. This toxin was also found in specimens from four of five other patients with pseudomembranous colitis, but not in six specimens obtained from patients with diarrhea of other etiologies. The toxin was completely inactivated by heating at 56 C for 30 min, but was not restored by the addition of fresh guinea pig complement. The cytopathic effect in mouse Y-1 adrenal cells did not resemble that of *Escherichia coli* enterotoxin. It appeared to be a heat-labile substance with a molecular weight of over 6,000. The titer of the toxin in the 12-yr-old girl was 1/1,000; it was 1/5,000 during the acute phase of illness, 1/100 while her symptoms were improving, and negative (1/5) 1 month after discharge. Pseudomembranous colitis may be caused by a bacterial toxin.

4932 INCIDENCE OF ANTIBIOTIC-RELATED DIARRHOEA AND PSEUDOMEMBRANOUS COLITIS. A PROSPECTIVE STUDY OF LINCOMYCIN, CLINDAMYCIN AND AMPICILLIN.

(Eng.) Robertson, M. B.; Breen, K. J.; Desmond, P. V.; Mashford, M. L.; McHugh, A. M. (Dept. Medicine, Univ. Melbourne, Melbourne, Australia). *Med. J. Aust.* 1(8):243-246; 1977.

An existing intensive drug-monitoring system was used to study the occurrence of pseudomembranous colitis and diarrhea in 100 patients treated with lincomycin and clindamycin. An equal number of matched patients treated with ampicillin were also studied. The incidence of diarrhea was 11% in the lincomycin-clindamycin group and 8% in the ampicillin group. One patient developed pseudomembranous colitis associated with two prolonged courses of lincomycin therapy. The results suggest that the risks associated with the use of lincomycin are acceptable if the drug is given for the approved specific indications.

4933 DIVERTICULAR DISEASE OF THE COLON. (Ge

Glauser, R.; Filippini, L. (Medizinisch
Klinik, Kantonsspital, Spitalstrasse, CH-6004-Lu
Switzerland). *Dtsch. Med. Wochenschr.* 102(20):7
759; 1977.

The diagnostic results of 100 patients with dive
ticular disease of the colon are presented. Eig
six patients were between 60 and 90 yr of age.
chief symptoms were abdominal pain, irregular st
fever, leukocytosis, and bleeding from the large
testine. In all cases, the diagnosis of diverti
losis of the large intestine with localization i
the sigmoid flexure was made radiologically or o
atively, and a rectosigmoidoscopy was performed
the majority of cases. Of the 100 patients, 23
were hospitalized with a diagnosis of diverticul
or diverticulitis. Inflammatory stenoses were
found in 14 patients, and 4 had mechanical ileus
Perforation subsequent to diverticulitis was see
in five patients, two of whom required surgery.
One patient had a colovesicular fistula, which h
to be treated surgically. Forty-four patients (
of 36 patients with diverticulosis with inflamma
symptoms and 26 of 64 diverticulitis patients) h
anal hemorrhage, and these were classified as ma
(31) and microhemorrhaging (13). Macrohemorrhag
occurred in 14 diverticulosis and 17 diverticuli
patients. Five patients required blood transfus
All patients were given conservative treatment c
sisting of a diet rich in roughage.

4934 PATHOGENESIS OF BLEEDING COLONIC DIVER CULOSIS.

(Eng.) Meyers, M. A.; Alons
D. R.; Gray, G. F.; Baer, J. W. (Dept. Radiology
New York Hosp., 525 E. 68th St., New York, NY 10
Gastroenterology 71(4):577-583; 1976.

Arteriographic and microangiographic techniques
histological sectioning were used to locate and
observe colonic diverticula in 10 patients with
bleeding colonic diverticulosis and in 20 contr
patients. In control colonic diverticula, the
rectum passes through the connective tissue sept
from the serosa to the submucosa. In colonic
diverticulosis, the cause of bleeding was found
be asymmetric rupture of the vas rectum either a
the dome of the diverticulum or at its antimesen
margin. The lesion was frequently associated wi
eccentric intimal thickening and thinning of the
media and duplication of the internal elastic la
These changes were not observed in control diver
ticula. It is suggested that in bleeding coloni
diverticulosis, the vessel wall responds to repe
injury from within the colon, resulting in the
observed structural changes and subsequent weake
of the artery prior to rupture.

4935 ON THE NATURE AND ETIOLOGY OF VASCULAR ECTASIAS OF THE COLON. DEGENERATIVE

LESIONS OF AGING. (Eng.) Boley, S. J.; Sammartano, R.; Adams, A.; DiBiase, A.; Kleinhaus, S.; Sprayregen, S. (Montefiore Hosp. and Medical Center, 111 East 210th St., New York, NY 10467). *Gastroenterology* 72(4):650-660; 1977.

Right colons, resected from patients with either suspected vascular lesions of the cecum or colonic carcinomas, were studied to gain information on the etiology and significance in gastrointestinal bleeding of these lesions, particularly in elderly patients. Colons from 19 patients with clinical and angiographic diagnoses of cecal vascular lesions were studied by injection and clearing, and by histological sections. In all injected specimens, one or more mucosal vascular ectasias were identified. The mucosal lesions appeared to be secondary to dilated tortuous submucosal veins that were the more prominent feature and were often present without the mucosal ectasia. This finding suggests that ectasias are caused by chronic, intermittent, low grade obstruction to submucosal veins with dilation and tortuosity initially of submucosal veins, then of venules, capillaries, and arteries of the mucosal vascular unit. Ultimately, precapillary sphincters lose their competency, producing small arteriovenous communications. The concept that ectasias are degenerative lesions was evaluated by studying 15 right colons resected for carcinoma with no history of bleeding. Mucosal ectasias were identified in four colons and submucosal ectasias in eight. These investigations suggested that these lesions (1) are vascular ectasias developing as a degenerative process of aging, (2) are present with or without bleeding in a significant portion of the population over 60 yr of age, (3) are multiple more often than single, and (4) may represent the commonest cause of major lower intestinal bleeding in the elderly.

4936 TREATMENT OF SECONDARY INTESTINAL DISORDERS FOLLOWING ANTIBIOTIC THERAPY WITH ULTRA-LEVURE (YEAST PREPARATION). DOUBLE-BLIND STUDY. (Fre.) Ligny, G. (No affiliation given.) *Rev. Fr. Gastroenterol.* (123):43-44; 1976.

4937 DISTURBANCES OF SEXUAL FUNCTION FOLLOWING RECTAL EXCISION AND SPHINCTER PRESERVING RESECTIONS OF THE RECTUM. (Ger.) Stelzner, F. (Zentrum der Chirurgie der Johann-Wolfgang-Goethe-Universitat, Theodor-Stern-Kai 7, D-6000 Frankfurt/Main, W. Germany). *Zentralbl. Chir.* 102(4):212-219; 1977.

4938 ZINC THERAPY OF ACRODERMATITIS ENTEROPATHICA. (Ger.) Braun-Falco, O.; von Liebe, V. (Dermatologische Klinik und Poliklinik der Universitat, Frauenlobstr. 9, D-8000 Munich 2, W. Germany). *Munch. Med. Wochenschr.* 119(2):37-42; 1977.

4939 CHRONIC APPENDICITIS IN ADULTS: ANALYTIC, CATAMNESTIC AND CRITICAL STUDY OF POST-OPERATIVE EVOLUTION (ON 310 CASES). (Fre.) Vauthey, P. (76, Grand-Rue, CH-1180 Rolle, Switzerland). *Praxis* 66(26):794-797; 1977.

4940 DIAGNOSIS OF COLONIC CARCINOMA--ENDOSCOPY VERSUS RADIOLOGY. (Ger.) Von Goumoens, E.; Nuesch, H. J.; Kobler, E.; Sauberli, H.; Deyhle, P. (Medizinische Poliklinik, Departement fur Innere Medizin, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):697-698; 1976.

4941 DURATION OF SYMPTOMS AND PROGNOSIS OF COLORECTAL CANCER [Abstract]. (Eng.) Irvin, T. T.; Greaney, M. G. (Royal Infirmary, Sheffield, England). *Gut* 18(5):A411; 1977.

4942 THE PROBLEM OF POST-OPERATIVE COMPLICATIONS AFTER COLONIC SURGERY BECAUSE OF MALIGNANT TUMORS. (Ger.) Riedler, L. (Chirurgische Universitatsklinik Innsbruck, Anichstr. 35, A-6020 Innsbruck, Austria). *Zentralbl. Chir.* 102(4): 236-242; 1977.

4943 ISCHEMIC COLITIS--AMEBIC COLITIS--RADIATION COLITIS: DIFFERENTIAL DIAGNOSTIC ASPECTS. (Ger.) Lux, G.; Fruhmorgen, P.; Zeus, J.; Phillip, J. (Med. Klinik mit Poliklinik, Universitat Erlangen, Krankenhausstr. 12, 8520 Erlangen, Postfach 3560, W. Germany). *Z. Gastroenterol.* 14(7): 695; 1976.

4944 ISCHEMIC COLITIS. (Fre.) Haddad, H. (Centre hospitalier universitaire de Sherbrooke, Sherbrooke, Quebec, Canada). *Rev. Fr. Gastroenterol.* (122):47-51; 1976.

4945 EROSIVE COLITIS IN PATIENTS USING ORAL CONTRACEPTIVES [Letter to Editor]. (Fre.) Favier, C. (Centre d'endoscopie digestive, 33, rue Joseph Vernet, F 84000 Avignon, France). *Nouv. Presse Med.* 6(23):2074; 1977.

4946 SURGICAL TREATMENT OF DIVERTICULITIS OF THE SIGMOID COLON. (Ger.) Pitzler, K.; Rupprecht, H. (Chirurgische Klinik der Ernst-Moritz-Arndt-Universitat, DDR-22 Greifswald, Friedrich-Loeffler-Str. 23 b, E. Germany). *Zentralbl. Chir.* 102(4):243-251; 1977.

4947 DIVERTICULAR DISEASE OF THE COLON IN PATIENTS UNDER 40 YEARS OF AGE. (Eng.) Simonowitz, D.; Paloyan, D. (4935 Estes, Skokie, IL 60076). *Am. J. Gastroenterol.* 67(1):69-72; 1977.

4948 INTERNAL SPHINCTER A CAUSE OF SYMPTOMS IN ANAL FISSURE [Abstract]. (Eng.) Arabi, Y.; Gatehouse, D.; Alexander-Williams, J.; Keighley, M. R. B. (General Hosp., Birmingham, England). *Gut* 18(5):A413-A414; 1977.

4949 DENERVATION OF THE ANAL SPHINCTER IN IDIOPATHIC ANORECTAL INCONTINENCE [Abstract]. (Eng.) Parks, A. G.; Swash, M. (St. Mark's Hosp., London, England). *Gut* 18(5):A414; 1977.

4950 SOME UNUSUAL NEUROMUSCULAR DISORDERS OF RECTUM AND COLON [Abstract]. (Eng.) Kaschula, R. O. C. (Red Cross War Memorial Children's Hosp., Cape Town, South Africa). *Arch. Dis. Child.* 52(6):514-515; 1977.

4951 HEMORRHOIDECTOMY BY RUBBER BAND LIGATION. (Ger.) Wienert, V. (Klinikum der Technischen Hochschule, Goethestrasse 27-29, 51 Aachen, W. Germany). *Fortschr. Med.* 95(25):1619-1622; 1977.

4952 DRAINAGE ILEUS--A REALITY. (Ger.) Gresser, A. (Krankenhaus der Barmherzigen Bruder, Prufeninger Schulgasse 9, D-8400 Regensburg, W. Germany). *Munch. Med. Wochenschr.* 118(47):1519-1520; 1976.

4953 TREATMENT OF INTUSSUSCEPTION IN CHILDREN--OPERATIVE TREATMENT VERSUS HYDROSTATIC REACTION. (Eng.) Veen, H. F.; Meradji, M. (Sophia Children's Hosp. and Neonatal Unit, Rotterdam, Netherlands). *Arch. Chir. Neerl.* 29(1):55-61; 1977.

4954 INFLAMMATION OF THE ANAL SPHINCTER. (Pol.) Tylicki, M. (Zespol Opieki Zdrowotnej Warszawa Mokotow, ul. Targowa 64 m 41, 03-734 Warsaw, Poland). *Pol. Tyg. Lek.* 31(47):2027-2029; 1976.

4955 MIXED JUVENILE AND ADENOMATOUS COLONIC POLYPOSIS. (Fre.) Barge, J.; Desvignes
G.; Maillard, J. N.; Potet, F. (Hopital L.-Mourier
F 92701 Colombes Cedex, France). *Gastroenterol. Clin. Biol.* 1(2):159-164; 1977.

4956 CICATRICIAL DIGITIFORM PSEUDOPOLYPOSIS O
THE COLON FOLLOWING ULCERATIVE HEMORRHAG
RECTOCOLITIS [Abstract]. (Fre.) Hardouin, J. P.; Blanc, D.; Barge, J.; Benaceraff, R.; Hay, J. M.; Rigaud, D. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):310; 1977.

4957 SPASTIC COLON SYNDROME: DIAGNOSIS AND CLINICAL ASPECT. (Ger.) Patzold, K. (II. Medizinische Klinik, Bezirkskrankenhaus Dresden-Friedrichstadt, Friedrichstr. 41, DDR-801 Dresden, E. Germany). *Dtsch. Z. Verdau. Stoffwec*
selkr. 36(1):23-29; 1976.

See also, 4696, 4711, 4730, 4740, 4745, 4755, 476
4767, 4768, 4842, 4890, 4898, 4959, 496
4965, 4966, 4970, 4972, 4974, 4993, 500
5073, 5172, 5182, 5183, 5186, 5193, 519
5195, 5212, 5214, 5215, 5223, 5230, 524
5248, 5257.

LARGE INTESTINE

Ulcerative Colitis

4958 THE RADIOLOGICAL DIFFERENTIATION BETWEEN ULCERATIVE AND GRANULOMATOUS COLITIS BY DOUBLE CONTRAST RADIOLOGY. (Eng.) Laufer, I.; Hamilton, J. (Hosp. Univ. Pennsylvania, Philadelphia, PA 19104). *Am. J. Gastroenterol.* 66(3):259-269; 1976.

Double contrast radiology was used to detect the early changes of colitis and to differentiate between ulcerative and granulomatous colitis in 50 consecutive patients with radiologically diagnosed nonspecific colitis. Patient preparation involved the administration of clear fluids for 24 hr, a mild laxative the evening before examination, and a cleansing enema of 2,000 cm^3 tap water 1 hr before examination. A suspension consisting of a 3:2 mixture of Barosperse and Interopaque was used for the double contrast examination. Barium was introduc
to the splenic flexure and was followed immediate
by the insufflation of air with rotation of the
patient to ensure adequate coating and distention
of all parts of the colon and rectum. The differ
tial diagnosis of ulcerative colitis, which was
successful in 23 patients, included the following
features: granular mucosa (due to edema and supe
ficial erosions), diffuse rectal disease (punched
out ulcers rarely seen in the rectum), continuous
disease (showing no normal mucosa in an involved
segment and no normal segments of bowel interveni
between two diseased segments), a normal terminal
ileum, and discrete ulcers invariably occurring o
a background of abnormal, granular mucosa. In co
trast, granulomatous colitis (which was successfu
diagnosed radiologically in 27 patients) was mani

fested by the absence of a granular appearance of the mucosa, a tendency towards discontinuous disease (skip lesions or discrete ulceration on the normal mucosa), involvement of the terminal ileum (frequently in continuity with disease in the cecum and ascending colon), and punched out rectal ulcers on a background of normal mucosa. Whereas the radiological assessment of rectal disease in ulcerative colitis was very accurate because of the diffuse nature of the disease, minimal or patchy disease was difficult to detect in granulomatous colitis. Endoscopic abnormalities were found in 13 of 27 patients with granulomatous colitis but were detected radiologically in only 8 of these patients. Nevertheless, in no case did the overall radiological diagnosis conflict with endoscopic or pathological information. The absence of indeterminate cases in this series is ascribed to the detail demonstrable by the double contrast technique and the inclusion of early cases whose appearance was not modified by treatment or by recurrent exacerbations and remissions.

4959 TWO-STAGE SURGICAL TREATMENT OF ACUTE COMPLICATED ULCERATIVE COLITIS: INDICATIONS, OBSERVATIONS, AND RESULTS.

(Ger.) Ewerwahn, W. J.; Winkler, R. (Chirurgische Universitats- und Poliklinik, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Dtsch. Med. Wochenschr.* 102(23):860-865; 1977.

A new two-step surgical procedure for the management of toxic megacolon in patients with ulcerative colitis is described, and results obtained in 14 patients are presented. The first stage consists of definitive multiple enterostomy and fistulization. Definitive proctocolectomy is performed in a second stage, during remission. Of 14 patients who underwent primary multiple enterostomies, only 3 died: 1 immediately after surgery, 2 others after 54 and 60 days. By comparison, the postoperative mortality was 100% in a group of 16 patients who underwent one-stage proctocolectomy. The two-stage procedure is indicated if, after 48-72 hr of conservative treatment, there is no response. Its indications should be extended to all acute cases requiring operation.

4960 PLASMA CELL ALTERATIONS IN ULCERATIVE COLITIS. AN ELECTRON MICROSCOPIC STUDY.

(Eng.) Gebbers, J. O.; Otto, H. F. (Inst. Pathology, Univ. Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Pathol. Eur.* 11(4):271-279; 1976.

Colon biopsies from 37 young patients with active ulcerative colitis (UC) were investigated by electron microscopy, with special regard to the inflammatory infiltrate of the lamina propria mucosae. The inflammatory infiltrate in UC was characterized by an accumulation of lymphocytes, macrophages, and plasma cells, with a close topographical relation existing between the plasma cells and other inflammatory cells. The plasma cells lost their characteristic oval shape within the infiltrate. The outer membranes were often multiangular and in close relation to other surface membranes or showed short extrusions that were in contact with other cells. In particular, the plasma cells were characterized by their highly developed rough endoplasmatic reticulum (RER). Frequently, plasma cells were seen with extensive dilated and grotesque deformed RER, which was electron lucent or contained only some flocculent material. The density of ribosomes and mitochondria was decreased, and the surface membranes were often not detectable. These cells represented different states of agony and cell death. The frequent occurrence of Russell bodies, Mott cells, and necrobiotic plasma cells was considered to be a morphological expression of pathological alterations of these cells and could be the morphological expression of an imbalance of the local immunoglobulin system in UC.

4961 ANTI-COLON ANTIBODIES IN ULCERATIVE COLITIS. A CLINICAL STUDY.

(Eng.) Marcussen, H. (Medical Dept. P, Div. Gastroenterology, Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen O, Denmark). *Scand. J. Clin. Lab. Invest.* 36(6): 763-767; 1976.

Various clinical parameters of ulcerative colitis were examined in 141 patients for possible correlation to the presence of circulating anticolon mucosal antibodies. The parameters were age, sex, duration of illness, type of course, degree of involvement, extracolonic hypersensitivity, and family history of allergies, ulcerative colitis, or symptoms of ulcerative colitis. The female:male ratio was 1.46:1. Some clinical signs of hypersensitivity were observed in 30% of the patients, and 20% of the patients had circulating anticolon antibodies. Although women comprised most of the patients with antibodies (2.63:1), none of the clinical factors, including sex and age, could be statistically correlated with the presence of antibodies. The appearance of anticolon antibodies is probably a secondary autoimmune response to tissue damage and is of little value in the clinical classification of ulcerative colitis.

4962 LYMPHOCYTOTOXIC AND RNA ANTIBODIES IN INFLAMMATORY BOWEL DISEASE: A COMPARATIVE STUDY IN PATIENTS AND THEIR FAMILIES.

(Eng.) Korsmeyer, S. J.; Williams, R. C., Jr.; Wilson, I. D.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *Ann. N.Y. Acad. Sci.* 278:574-585; 1976.

The recent observation of a significant familial occurrence of lymphocytotoxic antibodies (LCA) and antibodies to double-stranded RNA (αRNA) in systemic lupus erythematosus provided the basis for studies of LCA and αRNA in patients with chronic inflammatory bowel disease (IBD) and their families. LCA or αRNA were found in 60% of 23 probands with inflammatory bowel disease (either ulcerative colitis or Crohn's disease) and in 40% of their 90 family members. The combined prevalence of these antibodies in 69 control subjects (unrelated to probands) was only 7%. LCA prevalence was increased in both ulcerative colitis and Crohn's disease probands and relatives; αRNA were present only in Crohn's disease probands and relatives. The prevalence of LCA was significantly greater in close household contacts and nonconsanguineous relatives of IBD probands (40% and 50%, resp.) than among nonhousehold contacts or consanguineous relatives (19% and 24%, resp.); a similar trend was noted with respect to αRNA in Crohn's disease relatives. However, LCA and αRNA were more frequently observed in nonhousehold contacts and consanguineous relatives of IBD probands than in control subjects. There was no correlation between the expression of LCA and αRNA among Crohn's disease probands or their families. The antibody class of αRNA was the same in Crohn's disease probands and their positive family members. The significant occurrence of LCA and αRNA in patients with IBD supports the hypothesis that an environmental agent is important in the pathogenesis of Crohn's disease and ulcerative colitis. The increased prevalence of both antibodies in unaffected family members of IBD probands, particularly in close household contacts, may indicate the horizontal transmission of an infectious agent within these families. However, the fact that LCA and αRNA were also more frequent in consanguineous relatives without close household contact than in controls suggests that a genetic component may be operative in the expression of these antibody responses within the families of IBD probands.

4963 BILE ACID METABOLISM AND VITAMIN B_{12} ABSORPTION IN ULCERATIVE COLITIS. (Eng.)

Lenz, K. (Medical Dept. P., Div. Gastroenterology, Rigshospitalet, Blegdamsvej 9, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 36(6):769-775; 1976.

The effect of ulcerative colitis in the large intestine upon bile acid and vitamin B_{12} absorption in the small intestine, particularly the distal ileum, was investigated in 24 nonoperated patients. Bile acid and vitamin B_{12} absorption was also studied in 10 patients who had a colectomy followed by an ileostomy. Meal-stimulated duodenal bile acid concentrations were abnormally low in 13/24 nonoperated patients, and they decreased with increasing activity of the disease. Two of six colectomized patients had below-normal bile acid concentrations. The glycine/taurine ratio was normal in all but three cases, and deconjugated bile acids in the duodenum were not found in any of the patients. The cholylglycine-1-^{14}C breath test and fecal analysis showed normal ^{14}C levels in the breath in all but one of the nonoperated patients, but fecal output was related to disease activity. ^{14}C output in the breath was normal in the operated patients, but the levels in the ileal discharge were very high (15%-81%). Only five patients showed vitamin B_{12} malabsorption. These results indicate that bile acid absorption in the small intestine is disrupted by ulcerative colitis in the large intestine. Abnormally elevated levels of free bile acids in the ileal effluent of patients with a colectomy may indicate abnormal intestinal flora or a rapid intestinal transit time.

4964 AMYLOIDOSIS AND INFLAMMATORY BOWEL DISEASE

(Eng.) Shorvon, P. J. (St. Thomas' Hosp., Lambeth Palace Rd., London, SE1, England). *Am. J. Dig. Dis.* 22(3):209-213; 1977.

The literature concerning amyloidosis associated with inflammatory bowel disease is reviewed. Only 42 cases have been reported, and 33 of these are included in the review. Only 25 cases can be used as indisputable evidence to support the tenet that amyloidosis is a complication of inflammatory bowel disease. Of the 33 patients, 15 had ulcerative colitis; however, 9 of these were subsequently noted to have features of Crohn's disease rather than colitis. Thus, there is no clear evidence of amyloidosis complicating ulcerative colitis, but it seems to be a serious consideration in Crohn's disease. Of the patients, 24 were male, and the average age of onset of inflammatory bowel symptoms was 28 yr (range, 13-70 yr). The duration of disea before the diagnosis of amyloidosis was 1-20 yr, averaging 10 yr. Prolonged "extrabowel" suppuratio occurred in 23 patients. There seemed to be no association between the development of amyloidosis and steroid administration. In 25 cases, the ileum was affected by inflammatorv bowel disease, indicating that the rich lymphoid structures draining the bowel around the ileum were responsible for the development of amyloidosis. Of the patients in whom inflammatory bowel disease was diagnosed before death, seven survived less than 1 yr after the amyloid deposits were discovered, three survived 1-2 yr, one survived 14 yr, and seven were still alive at this report (1 surviving on renal dialysis). A prospective systematic study of amyloidos in a large number of patients with inflammatory bowel disease is needed.

4965 TOXIC DILATATION OF THE COLON. (Ger.)

Seppelt, U.; Hantschmann, H. (Abteilung fur Allgemeinchirurgie im Zentrum Operative Medizin I, Christian-Albrechts-Universitat Kiel, D-2300 Kiel, W. Germany). *Z. Gastroenterol.* 15(1):21-28; 1976.

General clinical, therapeutic, and prognostic aspects of toxic dilatation of the colon in ulcerati colitis are described with respect to 12 operated patients. The duration of the ulcerative colitis anamnesis varied from 3 months to 4.5 yr. Three patients developed toxic dilatation of the colon during the first manifestation of ulcerative colitis, but it occurred during the second or later recurrences in the others. The duration of the la recurrence of ulcerative colitis, i.e., the one th led to toxic dilatation, ranged from 6 days to 12 weeks. Surgery consisted of primary ileostomy and subsequent colectomy (3 cases), primary colectomy with simultaneous ileostomy (3), or coloproctectom (6). Three patients survived; all three were operated on within the first 10 days after manifestati of the recurrence of ulcerative colitis and within 4 days after the development of toxic dilatation. All other patients died of septic complications; six patients died of peritonitis sepsis within the first 2 postoperative weeks. The patients who die later developed protracted sepsis, stress ulcer, hemorrhage, or perforation of the abscess. The prognosis can be probably improved by early colostomy with double ileostomy prior to perforation.

4966 TREATMENT OF TOXIC MEGACOLON: A COMPARATIVE REVIEW OF 29 PATIENTS. (Eng.) Hartong, W. A.; Arvanitakis, C.; Skibba, R. M.; Klotz, A. P. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Am. J. Dig. Dis.* 22(3):195-200; 1977.

A review of 29 patients with toxic megacolon complicating ulcerative colitis was undertaken to compare the results of medical and surgical treatment, to determine the optimal timing for surgical intervention, and to identify possible precipitating factors. Twenty-one patients were treated medically with nasogastric suction, steroids, parenteral fluids, blood transfusions, and antimicrobial agents. Of these, 11 showed improvement by subjective and objective criteria and 10 failed to respond. Sixteen patients were treated surgically. This group comprised eight patients who failed to respond to medical treatment and eight treated surgically alone. Total proctocolectomy with ileostomy was performed in eight and subtotal colectomy and ileoproctostomy in eight with subsequent proctectomy and ileostomy in six patients. Six of eight patients treated primarily surgically improved, and two (25%) died. Seven of eight patients treated surgically after failure of medical trial showed definite postoperative improvement, and one failed to do so. Those who were operated on within the first 48-72 hr after the diagnosis of toxic megacolon responded uniformly well. Anticholinergics, opiates, barium enema, and colonoscopy were identified as possible precipitating factors in 70% of cases. The results indicate that early surgical therapy in toxic megacolon is associated with better results than medical therapy ($p<0.025$). Although intensive, optimal medical therapy plays a significant role in the management of toxic megacolon, failure to induce rapid improvement within 48-72 hr indicates definitive surgical treatment.

4967 URETERAL STENOSIS DUE TO RETROPERITONEAL FIBROSIS IN ULCERATIVE COLITIS. (Fre.) Girodet, J.; Mignon, M.; Bonfils, S. (Hopital Bichat, 170, boulevard Ney, F-75018 Paris, France). *Gastroenterol. Clin. Biol.* 1(4):361-364; 1977.

A rare case of ureteral stenosis is reported in a 41-yr-old man who had been suffering from repeated attacks of ulcerative colitis for 5 yr. Surgery revealed severe lesions of the left colon associated with a retroperitoneal fibrosis in which the left ureter was embedded. After the ureter was freed, a colectomy with an ileorectal anastomosis was performed. The clinical recovery was uneventful. Although local fibrosis is rarely reported in ulcerative colitis, its incidence may be underestimated and i.v. urography should be used more routinely in preoperative patients.

4968 ULCERATIVE COLITIS: CYTOLOGIC AND HISTOCHEMICAL CORRELATIONS. COMMENTARY ABOUT THE DEVELOPMENT OF A CASE. (Spa.) Mate Jimenez, J.; Moreno Otero, R.; Pajares Garcia, J. M.; Perez Cuadrado, S.; Martinez Raposo, A. (Gran Hospital del Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 69(5):651-656; 1977.

4969 THE CLINICAL AND RADIOLOGICAL PICTURES OF ULCERATIVE COLITIS AND CROHN'S DISEASE. (Ita.) Mercadante, G.; Rebulla, E.; Tarantino, G.; Rinaldi, A. (Clinica Medica II dell'Universita, Policlinico, I-90100 Palermo, Italy). *Radiol. Med.* 62(9):587-598; 1976.

4970 INFLUENCE OF INFLAMMATORY BOWEL DISEASE ON INTESTINAL MICROFLORA [Abstract]. (Eng.) Keighley, M. R. B.; Arabi, Y.; Dimock, F.; Burdon, D. W.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Gut* 18(5):A423-A424; 1977.

4971 RECTAL GOBLET CELL MUCOUS GLYCOPROTEINS IN ULCERATIVE COLITIS: STUDIES USING FLUORESCEIN-LABELLED LECTINS [Abstract]. (Eng.) Machell, R. J.; Stoddart, R. W.; Dick, A. P. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18 (5):A411; 1977.

4972 KUPFFER CELL UPTAKE OF MICROAGGREGATED ALBUMIN: (A) IN RELATION TO LIVER BLOOD FLOW; (B) IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Anderson, A. J.; James, O.; Wardle, E. N. (Dept. Medicine, Univ. Newcastle-upon-Tyne, England). *Gut* 18(5):A401; 1977.

4973 INCREASED SYNTHESIS OF PROSTAGLANDINS IN ULCERATIVE COLITIS [Letter to Editor]. (Eng.) Harris, D. W.; Swan, C. H. J. (North Staffordshire Medical Inst., Hartshill, Stoke on Trent, England). *Lancet* 2(8030):196; 1977.

4974 ULCERATIVE COLITIS AND MALIGNANCY [Abstract]. (Eng.) Macartney, J. C.; Thompson, H.; Cooke, W. T.; Allan, R. (General Hosp., Birmingham, England). *Gut* 18(5):A424; 1977.

4975 IMPAIRED IMMUNITY IN ULCERATIVE COLITIS WITH HYPOSPLENISM: THE RESPONSE TO THE INTRAVENOUS ANTIGEN ϕX174 [Abstract]. (Eng.) Ryan, F. P.; Holdsworth, C. D.; Verrier Jones, J. (Royal Infirmary, Sheffield, England). *Gut* 18(5):A424; 1977.

See also, 4718, 4719, 4892, 4902, 4926, 5075, 5198.

4976 FINE NEEDLE BIOPSY OF THE PANCREAS. (Eng.) Frederiksen, P.; Thommesen, P.; Skjoldborg, H. (Univ. Inst. Pathology, Municipal Hosp., 8000 Aarhus, Denmark). *Scand. J. Gastroenterol.* 36(6):785-791; 1976.

Fine needle aspiration biopsy of the pancreas was performed during surgery in 60 patients with symptoms such as occlusive jaundice or upper abdominal pain. Preoperative and peroperative examinations raised a suspicion of malignancy in 45 patients that was usually suggested by the presence of a palpable mass in the pancreas. The malignant diagnoses were supported by aspiration biopsies in 27 cases. Further examination of the remaining 18 patients revealed that the suspicious mass was due to either penetrating gastroduodenal ulcers or pancreatitis. The final clinical diagnoses showed that aspiration cytology had given only one false-positive and a few false-negative results and, therefore, should be used in conjunction with other diagnostic procedures.

4977 THE SPECTRUM OF RADIOGRAPHIC FEATURES OF ABERRANT PANCREATIC RESTS INVOLVING THE STOMACH. (Eng.) Kilman, W. J.; Berk, R. N. (Univ. Texas Southwestern Medical Sch. at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235). *Radiology* 123(2):291-296; 1977.

The radiologic features of 20 cases of pathologically confirmed heterotopic pancreatic tissue involving the stomach were studied. The aberrant rests were located in the gastric antrum in all cases, including the prepyloric area. The tissue was in the antrum in 13 cases, in the prepyloric region in 6 cases, and in the pyloric canal in 1 case. In all patients, the heterotopic tissue was located either on the greater curvature or on the posterior wall of the stomach. In all but one of the cases, a definite mass was identified by the upper gastrointestinal examination. In 12 cases, the mass had the broad base and smooth surface characteristic of an extramucosal intramural tumor. In eight cases, the lesion appeared to be sessile, with the narrow base typical of a gastric polyp. In every case, the surface of the aberrant pancreatic tissue was smooth. The mass was less than 1.0 cm in diameter in five cases, between 1 and 2 cm in six cases, and greater than 2 cm in eight cases. Nine cases showed umbilication or a central niche, but only four of these niches were barium-filled, permitting specific diagnosis of heterotopic pancreatic tissue. The umbilication in the other five was large in proportion to the size of the mass, resembling a healing gastric ulcer or an ulcerating mural tumor. Aberrant pancreatic tissue in the stomach produces a broader spectrum of radiographic findings than had been thought.

4978 FATE OF ORALLY INGESTED ENZYMES IN PANCREATIC INSUFFICIENCY: COMPARISON OF TWO DOSAGE SCHEDULES. (Eng.) DiMagno, E. P.; Malagelada, J. R.; Go, V. L. W.; Moertel, C. G. (Mayo Clinic, Rochester, MN 55901). *N. Engl. J. Med.* 296 (23):1318-1322; 1977.

To assess the fate and efficacy of p.o. ingested enzymes in pancreatic insufficiency, pancreatin wa administered to six patients by two schedules (8 tablets with a standard meal or 2 tablets hourly). In six normal controls, duodenal enzyme activity was quantified and inactivation of ingested enzyme was related to gastric and duodenal pH; in the six patients malabsorption was measured by fecal-balar studies. Postprandially, gastric pH was similar i controls and patients, <4.0 after 40 min. Duodena pH in pancreatic insufficiency declined to approximately 4.0 after 100 min, lower than in controls ($p<0.05$). Approximately 22% and 8% of trypsin anc lipase activity, resp., ingested with either schec were delivered to the ligament of Treitz. Prandia ministration was as effective as hourly administra in decreasing steatorrhea and perhaps more effecti in abolishing azotorrhea. The authors recommend t prandial administration of pancreatin for the trea ment of pancreatic insufficiency.

4979 ENZYME REPLACEMENT THERAPY OF EXOCRINE CREATIC INSUFFICIENCY IN MAN: RELATION BETWEEN IN VITRO ENZYME ACTIVITIES AND IN VIVO PO TENCY IN COMMERCIAL PANCREATIC EXTRACTS. (Eng.) Graham, D. Y. (Baylor Coll. Medicine, 1200 Moursu Ave., Houston, TX 77030). *N. Engl. J. Med.* 296(2 1314-1317; 1977.

Sixteen pancreatic extracts (capsules, tablets, a enteric-coated tablets) were assayed for enzyme a tivities, and the relation between the *in vitro* a tivities and *in vivo* potency was evaluated in six patients with steatorrhea secondary to chronic ex crine pancreatic insufficiency. Lipase activity ranged from 10 to 3,600 U/U, with 11 preparations containing <600 U/U. The preparations with the highest lipase activities were Ilozyme, 3.600; Ku zyme HP, 2,330; Festal, 2,073; Cotazym, 2,014; an Viokase, 1,636 U. Lipase activity *in vitro* corre ated with potency *in vivo* for tablets and capsule with tablets and capsules being effective in reducing steatorrhea by 56.1% ± 9% and 48.6% ± 10%, resp., ($p<0.001$). Enteric-coated tablets were less effective (20% ± 13% reduction, $p<0.02$). Th longer the gastric pH remain ≥ 4.0 ($r=0.915$, $p<0.0$ and the higher the average duodenal pH ($r=0.966$, $p<0.01$), the more marked the reduction in steator rhea.

4980 VALUE OF ERCP IN PANCREATIC SURGERY [Ab stract]. (Eng.) Burkhardt, K.; Seifer E.; Butke, H. (Reinhard-Nieter-Krankenhaus, Wilhe haven, W. Germany). *Endoscopy* 9(2):117; 1977.

4981 BIOASSAY AND RADIOIMMUNOASSAY OF SERUM CHOLECYSTOKININ IN PATIENTS WITH PANCRE ATIC DISEASE [Abstract]. (Eng.) Harvey, R. F.; Rey, J. F.; Howard, J. M.; Read, A. E.; Ederle, Vantini, I.; *et al.* (Bristol Royal Infirmary, Bri tol, England). *Rend. Gastroenterol.* 9(1):66; 19

4982 DOES SANTORIN'S DUCT PLAY A PART IN PA OLOGY? A STUDY OF ERCP FINDINGS [Abst

Eng.) Papp, J.; Tulassay, Z.; Hajos, E.; Bielaw-
ki, J.; Jolesz, J.; Kollin, E. (Semmelweis Univ.
edical Sch., Budapest, Hungary). *Endoscopy* 9(2):
19; 1977.

983 MALFUSION OF DORSAL AND VENTRAL PANCREAS; A CAUSE OF PANCREATITIS [Abstract]?
ng.) Cotton, P. B.; Kizu, M. (Middlesex Hosp.,
ndon, England). *Gut* 18(5):A400; 1977.

984 INDUCTION OF METASTASIZING ADENOCARCINOMA OF THE PANCREAS BY DIPN [Abstract]: (Eng.)
yers, H. J.; Dail, D. H.; Orloff, M. J. (Univ.
alifornia, San Diego, CA). *Gastroenterology* 72(5):
26; 1977.

4985 AXIAL COMPUTER TOMOGRAPHY IN ACUTE AND CHRONIC PANCREATITIS. (Ger.) Baert, A. L.; Ponette, E.; Pringot, J.; Marchal, G.; Dardenne, A.; Coenen, Y. (Univ. Hosp. Capucienovoer 35, 3000 Leuven, Belgium). *Radiologe* 17(4):181-188; 1977.

See also, 4510, 4578, 4598, 4753, 4775, 4785, 4832, 4909, 4910, 4990, 4992, 5056, 5154, 5165, 5168, 5181, 5191, 5244.

PANCREAS

Pancreatitis

986 ACUTE PANCREATITIS--A FIVE-YEAR REPORT. (Ger.) Rosahl, W.; Honisch, N. (II. Med-
zinische Klinik, Bezirkskrankenhaus, Auenweg 38,
DR-45 Dresden, E. Germany). *Dtsch. Gesundheitsw.*
2(22):1037-1040; 1977.

herapeutic results achieved in 184 patients with
cute pancreatitis are presented. According to
ummerle's grading, 105 patients were in grade I,
3 in grade II, and 6 in grade III. Diseases of
he bile duct were seen in 99 cases. Fourteen pa-
ients had had a cholecystectomy for cholelithiasis.
epending on grade, therapy consisted of relief by
astric probe for several days, atropinization,
.v. infusion, tetracycline or ampicillin treat-
ent, and, in 142 cases, Contrykal therapy for 3-6
ays. Interim surgery was performed on only 56
atients who developed complications despite an
nitial improvement. Cholelithiasis, choledocholi-
hiasis, and stenosis of Oddi's sphincter were
ound in most of these patients upon surgery. The
verall mortality was 10/184; 7 of these patients
ere >60 yr old. The mortality was 3/95 in grade I
pancreatitis was only a secondary condition to
ore serious diseases in all 3); 3/73 in grade II,
nd 4/6 in grade III (the cause was total pancre-
tic necrosis in 3). The results of interim sur-
ery were largely satisfactory. The prognosis of
cute hemorrhagic pancreatitis was unfavorable
egardless of therapeutic method.

987 GLUCAGON LEVELS IN ACUTE PANCREATITIS. (Eng.) Waterworth, M. W.; Barbezat, G. O.; Vinik, A. I.; Bank, S.; Child, P. (Groote Schuur Hosp., Cape Town, South Africa).

Serial serum immunoreactive glucagon determinations were carried out in 15 patients with acute pancreatitis. Six patients who subsequently received either a 1-mg i.v. bolus injection of glucagon or an infusion (15 μg/kg/hr for 6 hr followed by 10 μg/kg/hr for 18 hr) of glucagon had a basal mean blood glucagon level of 500 ± 132 pgEq/ml; the nine remaining patients who served as controls and received no glucagon had a mean basal level of 369 ± 126 pgEq/ml; these levels are approximately 4-5 times higher than normal. The six patients who received glucagon had fivefold increases of circulating immunoreactive glucagon over the basal level. These levels rapidly returned to basal levels after the glucagon infusions had been stopped. Blood glucose levels were significantly higher in patients receiving glucagon than those receiving a placebo. The results demonstrate that most patients with acute pancreatitis have raised blood levels of immunoreactive glucagon.

4988 IDIOPATHIC "JUVENILE" CHRONIC PANCREATITIS. CORRELATION BETWEEN IDIOPATHIC AND ALCOHOL-INDUCED CHRONIC PANCREATITIS. (Ger.) Ammann, R. (Departement fur Innere Medizin, Universitat Kantonsspital, Ramistr. 100, CH-8091 Zurich, Switzerland). *Dtsch. Med. Wochenschr.* 101(49):1789-1794; 1976.

The clinical picture, function, course, and prognosis of 13 cases of idiopathic juvenile chronic pancreatitis seen in 192 cases of chronic pancreatitis are discussed. A genetic disturbance is assumed to be the cause of the disease. Fifty-one of the chronic pancreatitis patients had idiopathic chronic pancreatitis. Idiopathic juvenile chronic pancreatitis can be distinguished from senile chronic pancreatitis by the lower mean age at onset of disease (25.6 yr), predominance of male patients (12/13 patients), typical pancreatitis recurrences (13/13), and frequency of pancreatic calcifications (10/13). The course of the disease appears to be benign, but of long duration.

4989 CHRONIC PANCREATITIS: A CAUSE OF CHOLESTASIS. (Eng.) Scott, J.; Summerfield, J. A.; Elias, E.; Dick, R.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 18(3):196-201; 1977.

The morphology of the bile ducts was studied using endoscopic retrograde cholangiopancreatography (ERCP), or percutaneous or i.v. cholangiography in 38 patients with nongallstone chronic pancreatitis. Stenosis of the intrapancreatic portion of the distal common bile duct was demonstrated in 11 patients. Ten of the 11 developed transient cholestasis during exacerbations of their chronic pancreatitis. In six, cholestasis eventually persisted requiring surgical relief. Secondary biliary cirrhosis was present in one patient. No evidence of pancreatic carcinoma was found in the patients explored surgically. Ten patients are alive more than 1 yr after diagnosis. Chronic pancreatitis was of alcoholic etiology in 10 patients with biliary stenosis. Cholestasis and biliary stricture are common but poorly recognized complications of nongallstone chronic pancreatitis, especially when pancreatitis is severe and due to alcohol.

4990 WIRSUNG's DUCT OF THE NORMAL PANCREAS AND CHRONIC PANCREATITIS. A STUDY BY SCANNING AND TRANSMISSION ELECTRON MICROSCOPY. (Ger.) Lederer, P.; Stolte, M.; Tulusan, H. (Pathologisches Institut, Universitat Erlangen-Nurnberg, Krankenhausstrasse 8-10, D-8520 Erlangen, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 372(2):109-121; 1976.

Ninety-six pancreatic duct sections from 39 patients with chronic pancreatitis, 5 patients with retention or concurrent pancreatitis due to carcinoma of the head of pancreas or of the ampulla of Vater, and 6 subjects with a normal pancreas were examined by scanning and transmission electron microscopy. Unlike the normal pancreas, the pancreatic duct in pancreatitis showed alterations in caliber due to tapering or roundish vaults and wrinkles and an undulating surface. The surface of the normal duct consisted of a homogeneous layer of microvilli, but that of the diseased duct showed flattening of the epithelium with loss of microvilli, epithelial defects of varying size, and alternation of elevated and hyperplastic epithelium with flattened epithelium. The typical morphological picture of chronic pancreatitis is the result of a combination of a dilated duct, an irregular caliber due to tapering, and a flattened epithelium with loss of microvilli. The combination of an irregular caliber and an elevated or hyperplastic epithelium is indicative of a still-active inflammatory process.

4991 ORAL CHOLECYSTOGRAPHY AFTER ALCOHOLIC PANCREATITIS. (Eng.) Roller, R. J.; Mallory, A.; Caruthers, S. B., Jr.; Schaefer, J. W. (Denver General Hosp., 8th at Cherokee, Denver, CO 80204). *Gastroenterology* 73(2):218-220; 1977.

Retrospective and prospective studies were carried out to evaluate the efficacy of p.o. cholecystography (OCG) performed before hospital discharge on alcoholic patients with acute pancreatitis. In the retrospective study, OCG adequately opacified the gallbladder in 21 of 26 patients. Of the five patients with inadequate opacification, one was jaundiced at the time of OCG; the other four had OCG before resumption of solid diet. In the prospective study, OCG done in nonjaundiced patients shortly after resumption of food yielded adequate opacification in 19 of 21 patients without gallstones. OCG performed after resumption of a solid diet and before hospital discharge is usuall successful in opacifying the gallbladder in nonjaundiced alcoholic patients with acute pancreatiti not caused by gallstones.

4992 PREVENTION, DIAGNOSIS, AND TREATMENT OF PANCREATIC ABSCESS. (Eng.) Ranson, J. C.; Spencer, F. C. (New York Medical Center, 560 First Ave., New York, NY 10016). *Surgery* 82(1):99 106; 1977.

Factors influencing the genesis of major peripancreatic infection (MPI) were analyzed in 330 patients with pancreatitis. MPI developed in 28. Management of MPI was reviewed in 35 patients, including 7 admitted with MPI. MPI was common in postoperative pancreatitis (39%), compared with alcoholic (6.6%), biliary (3.6%), or other causes (15%). "Severity" of pancreatitis was estimated b 11 early prognostic signs, which were reported previously. With fewer than three signs, MPI develop in 2.7%, with three to five signs, 32%; with more than five signs, 50%. Treatment of pancreatitis also influenced MPI. Early laparotomy increased M incidence from 1.6% to 23% in mild pancreatitis an from 24% to 67% in severe pancreatitis. Early p.o feeding also appeared to predispose to MPI. Prolonged nasogastric suction and avoidance of early operation reduced MPI incidence from 16% in the fi 100 patients to 5% in the next 230 patients. Outcome of MPI reflected severity of underlying pancreatitis. Mortality with fewer than three signs was 14%; with three to five signs, 65%; with more than six signs, 100%. Mortality was only 26% in 1 patients treated with radical sump drainage of the entire peripancreatic retroperitoneum, compared t 75% of 16 patients treated with conventional local drainage. MPI is related to the etiology and severity of pancreatitis as quantified by early signs.

rly laparotomy for pancreatitis increases MPI. eatment of MPI with wide sump drainage appears to e more effective than local drainage.

93 COLONIC STENOSES DUE TO PANCREATITIS. (Ger.) Hoffmeister, A. W.; Trede, M. hirurgischen Klinik, Klinikum Mannheim der Univ. eidelberg, Theodor-Kutzer-Ufer, 68 Mannheim 1, W. rmany). *Fortschr. Med.* 95(15):1034-1036; 1977.

94 SURGICAL TREATMENT OF CHRONIC PANCREATITIS: INDICATIONS AND EARLY RESULTS. er.) Gall, F.; Stadelmann, O. (Stadt. Krankenanalten, Jakob Henle Strasse 1, 851 Furth/Bayern, W. rmany). *Fortschr. Med.* 95(15):1023-1028; 1977.

95 SIGNIFICANCE OF ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERP) FOR THERAPY OF CHRONIC NCREATITIS--RESULTS OF A FOLLOW-UP STUDY [Abract]. (Eng.) Phillip, J.; Koch, H.; Rosch, W.; tticher, R.; Schaffner, O.; Schmid, A. (Dept. Medine, Univ. Erlangen-Nurnberg, W. Germany). *Gastroterology* 72(5, Part 2):1113; 1977.

96 VALIDITY OF ERCP AFTER ACUTE OR RELAPSING PANCREATITIS WITH REFERENCE TO THE THEREUTIC PROCEDURE [Abstract]. (Eng.) Butke, H.; ifert, E. (Reinhard-Nieter-Krankenhaus, Wilhelmsven, W. Germany). *Endoscopy* 9(2):118; 1977.

97 CORRELATION OF PANCREATIC FUNCTION TEST AND ENDOSCOPIC PANCREATOGRAPHY [Abstract]. ng.) Lux, G.; Tympner, F.; Koch, H.; Rosch, W.; mschke, W. (Dept. Medicine, Univ. Erlangen-Nurnrg, Erlangen, W. Germany). *Endoscopy* 9(2):117-8; 1977.

98 C3 AND α-1-ANTITRYPSIN IN HUMAN PANCREATITIS [Abstract]. (Eng.) Smith, W. I., .; Lombardi, B.; Rabin, B. S.; Van Thiel, D. H.; mmarino, R. M. (Univ. Pittsburgh, Pittsburgh, PA 261). *Gastroenterology* 72(5, Part 2):1134; 1977.

4999 PURE PANCREATIC JUICE RESPONSE TO SECRETIN IN NORMAL SUBJECTS AND CHRONIC PANCREATITIS [Abstract]. (Eng.) Denyer, M. E.; Tough, S.; Townson, J.; Cotton, P. B. (Middlesex Hosp. and Medical Sch., London, England). *Gut* 18(5):A415; 1977.

5000 REPRODUCIBILITY OF VISCOSITY ASSESSMENT IN PURE HUMAN PANCREATIC JUICE [Abstract]. (Eng.) Tympner, F.; Rosch, W.; Domschke, W.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Endoscopy* 9(2):118; 1977.

5001 INTRANASAL CHOLECYSTOKININ OCTAPEPTIDE IN CHRONIC PANCREATITIS [Letter to Editor]. (Eng.) Pap, A.; Varro, V. (Univ. Medical Sch., H-6701 Szeged, Hungary). *Lancet* 2(8032):294; 1977.

5002 OBSTRUCTIVE JAUNDICE DUE TO PANCREATITIS [Abstract]. (Eng.) Wapnick, S.; Purow, E.; Grosberg, S.; Suster, B.; LeVeen, H. H. (Brooklyn Veterans Admin. Hosp., Brooklyn, NY). *Gastroenterology* 72(5, Part 2):1145; 1977.

See also, 4578, 4584, 4589, 4596, 4787, 4976, 4979, 4982, 4983, 4905, 5151.

LIVER AND BILIARY TRACT

03 THE INFLUENCE OF PREDNISOLONE ON HEPATIC FUNCTION IN NORMAL SUBJECTS: EFFECTS ON LACTOSE ELIMINATION CAPACITY, SULFOBROMOPHTHALEIN ANSPORT MAXIMUM AND STORAGE CAPACITY, AND D-GLURIC ACID OUTPUT. (Eng.) Weiersmuller, A.; Colbo, J. P.; Bircher, J. (Dept. Clinical Pharmacology, iv. Berne, Murtenstrasse 35, CH-3010 Berne, Switrland). *Am. J. Dig. Dis.* 22(5):424-428; 1977.

ver function was assessed in nine volunteers fore and after administration of 20 mg prednisone, p.o., for 4 days, to investigate the pharmalogical effects of corticosteroids on liver function tests. Significant decreases in plasma cortisol (mean control level, 17.9 ± 2.4 μg/100 ml; during prednisolone treatment, 1.4 ± 0.9 μg/100 ml) and conjugated bilirubin levels (-40% during treatment) were observed, but the galactose elimination capacity, the BSP tests, and the urinary D-glucaric acid output remained unchanged. No pharmacological effect of this corticosteroid hormone could be detected.

5004 INCREASED LITHOGENICITY OF BILE ON FASTING IN NORMAL SUBJECTS. (Eng.) Williams, C.

N.; Morse, J. W. I.; MacDonald, I. A.; Kotoor, R.; Riding, M. D. (Gastrointestinal Res. Lab., 5849 University Ave., Halifax, Nova Scotia, Canada B3H 4H7). *Am. J. Dig. Dis.* 22(3):189-194; 1977.

The effect of different periods of overnight fasting on bile lithogenicity was studied in 19 normal men and 22 normal women. The molar percentages of bile acid, phospholipid, and cholesterol, determined after random overnight fasts of 9, 12, and 16 hr, were plotted on triangular coordinates. The molar percentage of cholesterol increased in both men and women. Analysis using criteria for cholesterol saturation revealed that 4.50% of normal women were lithogenic at 9.1 hr and 54.5% at 16.5 hr ($p < 0.005$). A similar trend in men was not significant. The mean values for both sexes were lithogenic at 16 hr only. Lithogenic bile was present in four men and one woman at 9 hr fasting and became more lithogenic with longer fasting. Analysis using the criteria of Hegardt and Dam revealed an increased proportion of both sexes moving into the metastable-labile and supersaturated zones on fasting, again with significant changes for women ($p < 0.01$). The duration of fasting is important in interpreting the presence of lithogenic bile; although more pronounced in women, both sexes showed increased cholesterol saturation in bile with fasting.

5005 ALPHA-1-ANTITRYPSIN BODIES IN THE LIVER.

(Eng.) Blenkinsopp, W. K.; Haffenden, G. P. (St. Mary's Hosp., London W2, England). *J. Clin. Pathol.* 30(2):132-137; 1977.

The frequency of alpha-1-antitrypsin cytoplasmic bodies in hepatocytes, thought to indicate the possession of the Z allele for alpha-1-antitrypsin deficiency, was studied in liver necropsy specimens of 64 patients with cirrhosis, 9 with hepatic fibrosis, 15 with hepatocellular carcinoma, 76 with severe panacinar emphysema, and 110 controls. PAS staining, immunofluorescence, or immunoperoxidase methods revealed these bodies in the tissues of 4 controls, 10 patients with cirrhosis ($0.01>p>0.005$), 4 patients with hepatic fibrosis ($p<0.001$), 4 patients with hepatocellular carcinoma ($p<0.001$), and 6 patients with emphysema ($0.30>p>0.20$). Heterozygous (PiMZ) alpha-1-antitrypsin deficiency may be associated with an increased incidence of cirrhosis, hepatic fibrosis, and hepatocellular carcinoma.

5006 COMPARATIVE STUDY OF THE SERUM LEVELS OF NONSPECIFIC CROSS-REACTING ANTIGEN AND CARCINOEMBRYONIC ANTIGEN (CEA): A CLINICAL ASSESSMENT.

(Fre.) von Kleist, S.; Troupel, S.; King, M.; Burtin, P. (Laboratoire d'Immunochimie, Institut de Recherches Scientifiques sur le Cancer, 7, rue Guy Mocquet, B.P. No. 8, 94800 Villejuif, France). *Bull. Cancer (Paris)* 63(4):627-632; 1976.

Serum levels of nonspecific cross-reacting antigen (NCA) and carcinoembryonic antigen (CEA) were measured radioimmunologically using a double-antibody technique in blood donors (controls) and in patients with nonmalignant and malignant diseases. The CEA and NCA levels were comparable in
controls, and NCA levels were slightly elevated in
two of three sera of the cancer patients, ranging
from 150 to 260 ng/ml. However, NCA was highly ele
vated in patients with pulmonary diseases, exceedi
those levels found in lung cancer patients. A
raised NCA level was rare in patients with liver
diseases, and it was only moderately elevated
in intestinal benign or malignant diseases.
NCA levels varied less than those for CEA in colic
cancer patients, and they stabilized between a
mean value of 130 and 150 ng/ml. In benign diseas
the NCA level was significantly higher in men than
in women. No sexual difference was observed in
the cancer patients.

5007 THE DETECTION OF 3β-HYDROXY-5-CHOLENOIC ACID IN HUMAN AMNIOTIC FLUID. (Ger.)

Paumgartner, G.; Deleze, G.; Karlaganis, G.; Giger
W.; Reinhard, M.; Sidiropoulos, D. (Institut fur
Klinische Pharmakologie, Universitat Bern, Murten-
strasse 35, CH-3010 Bern, Switzerland). *Schweiz.
Med. Wochenschr.* 107(15):529-531; 1977.

Studies of amniotic fluid specimens from 18 pregna
women without liver diseases in whom amniocentesis
was indicated because of risk pregnancies suggest
a fetal pathway of bile acid synthesis leading to
the formation of 3β-hydroxy-5-cholenoic acid (3H5)
Bile acids were isolated by gas chromatography.
total concentration of bile acid in amniotic flui
taken between the 28th and 42nd day of gestation
ranged from 0.9 to 2.4 μM. In addition to cholic
and chenodeoxycholic acid, 3H5 was also found in
all specimens. These bile acids are not found in
the serum of healthy subjects. Of the total concentration of bile acids, 33% consisted of cholic
acid, 21% chenodeoxycholic acid, and 34% 3H5. De-
oxycholic acid was only detected in 13 women and
lithocholic acid in 9 pregnant women. The presen
of a considerable amount of 3H5 in amniotic fluid
lends credence to the hypothesis that a fetal pat
way of bile acid synthesis exists that is initiat
by the oxidation of the cholesterol side chain.

5008 ASCORBIC ACID DEFICIENCY IN LIVER DISEA

(Eng.) Beattie, A. D.; Sherlock, S.
(Royal Free Hosp., London, England). *Gut* 17(8):
571-575; 1976.

Since alcoholism and hepatic siderosis are closel
related to liver disease, the prevalence of vitam
C deficiency was investigated in 138 patients wit
liver disease and 28 normal controls. The patien
included 37 with alcoholic liver disease, 25 with
primary biliary cirrhosis, 12 with acute hepatiti
19 with chronic active hepatitis, 13 with cryptogenic cirrhosis, 13 with extrahepatic cholestasis
6 with extrahepatic portal hypertension, 4 with
Gilbert's disease, 3 with Wilson's disease, 3 wit
drug-induced cholestasis, 1 with Budd-Chiari syndrome, 1 with carcinoid syndrome, and 1 with cong
ital hepatic fibrosis. The mean leukocyte ascor
acid (LAA) level was significantly reduced in the
patients with alcoholic liver disease (124.3 ± 7.

M/10^8 WBC, $p<0.01$) and primary biliary cirrhosis
130.0 ± 10.2 nM/10^8 WBC, $p<0.05$) in comparison with
ontrols (161.8 ± 6.8 nM/10^8 WBC). In the primary
iliary cirrhosis patients, cholestyramine therapy
9 patients) was associated with significantly lower
evels of the vitamin (106.2 ± 11.4 nM/10^8 WBC,
<0.05). Liver ascorbic acid measured in biopsies
n 20 patients was significantly correlated with
AA ($r=0.807$, $p<0.001$). No significant correlation
as found between LAA and hematological indices,
onventional liver function tests, or cholesterol
evels in any group of patients. Patients with
AA levels below 100 nM/10^8 WBC had significantly
igher antipyrine half-lives (mean=28.3 hr) than
atients with LAA levels above this level (mean=18.6
r, $p<0.05$). Delayed drug metabolism related to
ow LAA should be considered when drugs metabolized
y the liver are prescribed for patients with alco-
olic liver disease or primary biliary cirrhosis.

009 LABORATORY DIAGNOSIS OF LIVER AND BILE
DUCT DISEASES. (Ger.) Peters, J. E.;
eef, L. (Institut fur Klinische Chemie und Labora-
oriums-diagnostik, Bezirkskrankenhaus Halle, Halle,
. Germany). *Z. Gesamte Inn. Med.* 32(2):29-32; 1977.

complex laboratory diagnosis of hepatobiliary
iseases is proposed on the basis of mathematical
nalyses of data obtained from 1,202 patients with
epatobiliary diseases, 73 patients with other di-
eases, and 45 clinically healthy subjects. Nearly
4% of all patients with hepatobiliary diseases can
e recognized by a preliminary diagnostic program
omprising glutamic-pyruvic transaminase, alanine
minopeptidase, and hepatitis B antigen determina-
ions and relevant clinical findings (palpation,
aundice, and hepatic skin signs). In a further,
ondiscriminatory approach, glutamic-pyruvic trans-
minase, glutamic-oxalacetic transaminase, leucine
minopeptidase, alkaline phosphatase, alanine amino-
eptidase, cholesterol, bilirubin, β-glucuronidase,
nd thymol tests should be used to eliminate false-
ositive cases and to establish the class of hepato-
iliary disease. A BSP test is justified for the
ollow-up of cirrhotic patients and patients in
hom the preliminary diagnostic and anamnestic data
o not permit plausible interpretation.

010 LIVER ANGIOMA. (Fre.) Gruner, M.; Jab-
lonski, J. P. (No affiliation given).
n. *Chir. Infant.* 17(5/6):408-419; 1976.

he symptoms and treatment of 39 children with liver
ngiomas (LA) are described. The diagnosis was
ade histologically in 31 patients, on operation
n 4, and by arteriography in 4. Two types of LA
ere observed: solitary (23) and multinodular (13).
he latter was more frequent among females and,
n most cases, was manifested by a marked increase
n the size of the abdomen. Cardiac involvement
nd cutaneous or visceral angiomas were evident in
ix patients. Six patients without cardiac involve-
ent did not have cutaneous angiomas, but their
iver sizes were greater than the former group.
adiological tests revealed calcifications in one
patient and vascular calcifications in two. Marked anemia was observed in 8/10 patients, and 2 of these had elevated transaminase levels. Radiotherapy was given to 10 children: 4/6 with LA plus cardiac insufficiency were cured but 2 died (1 at the start of and 1 after treatment). Three of six patients without cardiac involvement who received radiotherapy were cured, whereas two died either at the start of or after treatment. Corticoid therapy was ineffective in two children. Surgery was given to 10/13 patients. Seven were cured (all had been irradiated) and five died. Of the 23 solitary LA, 13 were on the left side of the liver, 8 on the right, and 3 were in the center. Peritumoral adherences were very marked in three patients. Upon surgical exploration, the fragility of the tumor resulted in pseudocapsule rupture with uncontrollable hemorrhaging. Treatment consisted of surgery in 17 patients and radiotherapy in 4. Six of the former group died of surgical complications. Three of the four irradiated patients were cured and one died. Surgery is not the ideal treatment for LA and should only be used for massive tumors. Radiotherapy is the preferred treatment.

5011 ECHOTOMOGRAPHY OF LIVER TUMORS IN CHILDREN. (Fre.) Gauthier, N.; Bonnin, A. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):372-379; 1976.

Echotomography was used to evaluate liver tumors in 12 children with benign tumors (1 hamartoma), malignant tumors (6 hepatoblastomas), metastases (3), and a hydatid cyst (2). Liquid and solid tumors were distinguished. The former included the hamartomas and hydatid cysts, and they evoked a weak echo. The solid tumors (i.e., the hepatoblastomas) and, to a lesser extent, the metastases evoked a stronger echo.

5012 BIOLOGICAL CONTRIBUTION TO THE DIAGNOSIS OF PRIMARY LIVER TUMOR. (Fre.) Buffe, D.; Rimbaut, C. (Laboratoire d'Immunochimie, Institut de Recherches sur le Cancer, Villejuif, France). *Ann. Chir. Infant.* 17(5/6):379-385; 1976.

The usefulness of the α-fetoprotein (AFP) test and other biological tests in the detection of malignancies is presented. The AFP test was positive in 43/49 sera of children with confirmed hepatomas or hepatoblastomas, as determined by immunodiffusion. Two of the negative sera were positive when tested by radioimmunodiffusion. In a series of 494 other malignancies with or without hepatic metastases, the test was positive in 87% of the patients with malignant teratomas and in 91% of those with hepatomas or hepatoblastomas. A positive AFP test was also observed in 25 patients with hepatitis, 5 with tyrosinosis, and 3 with atresia of the intrahepatic bile duct. The test was always negative in benign hepatic tumors. The AFP level varied from 1 mg/ml in acute hepatitis to 600 ng/ml in hepatomas. Further, α_2H globulins were detected in 80% of tumor patients, especially those with liver cancer. The presence of carcinoembryonic antigen has been associated with tumors of the digestive tract. Other biological compounds tested to indicate the presence of malignancies include coagulation factors, alkaline phosphatase, aldolase, and transaminases.

5013 RADIOLOGICAL ASPECTS OF PRIMARY LIVER TUMOR IN CHILDREN. (Fre.) Hassan, M.

(Service de radiologie, Hopital des Enfants Malades, 149, rue de Sevres, 75015 Paris, France). *Ann. Chir. Infant.* 17(5/6):357-382; 1976.

Arteriographic studies of primary liver tumor (LT) were performed in 43 children. All patients were explored by global aortography (method of Seldinger), sometimes complemented by a selective injection. There were 29 malignant tumors (MT) and 14 benign tumors (BT). Arteriography was positive for LT in 40/43 patients and inconclusive in 1 case each of hamartoma, multinodular capillary angioma, and abnormal vascularization. The most characteristic vascular symptomatology of the malignant tumors included the penetration of new vessels into the tumor, early venous intratumor opacification, and an inhomogenous appearance of the parenchymal myography. The symptoms of benign tumors were much less consistent, and they were classified as cystic avascular, hypervascular, mixed, and silent forms. The first two were recognized easily. Mixed forms were usually large, with the vascularization classically considered malignant. All four forms showed common features: the hypervascularization was distal and peripheral and was made up of small, sometimes dysplasic vessels. The hypervascularization did not seem to penetrate the tumor, but remained at its periphery. Benign tumors had a network of large, dysplasic arteries, whereas malignant tumors had a normal number of arteries.

5014 CLINICAL ASPECTS OF LIVER TUMORS. LOCALIZATION OF LIVER TUMORS. (Fre.) Prevot, J.; Duval, J.

(No affiliation given). *Ann. Chir. Infant.* 17(5/6):348-358; 1976.

The problems of correctly diagnosing liver tumors in children are surveyed briefly. Tumefactions of nonhepatic origin may mimic liver tumors. A 1-yr-old child presented with a large tumor of the median epigastric region that simulated a renal or liver tumor. However, barium transit revealed a tumor of pancreatic origin that turned out to be a giant primary cyst of the head of the pancreas. Hepatic tests and a myelogram were normal in a 6-yr-old boy who was hospitalized for a tumor in the right hypochondrium with colic compression and microcalcifications. At laparotomy, a large extrahepatic retroperitoneal tumor was excised. In a 2-yr-old boy, arteriography revealed a retroperitoneal embryonic sarcoma. Hepatic scintigraphy, however, was normal. One 6-yr-old girl presented with a mass in the left flank without specific humoral retention, indicative of a kidney tumor, although i.v. urography was normal. Surgery revealed a hemangioendothelioma. Other cases observed include liver tumors of ectopic localization, hepatic hamartomas simulating a mesentery cyst, and a calcified hemangioma with digestiv symptomatology evoking the diagnosis of digestive duplication or sympathoblastoma.

5015 PRIMARY LIVER TUMORS IN CHILDREN. PATHO-ANATOMICAL STUDY OF 100 CASES. (Fre.)

Gubler, J. P.; Gerard-Marchant, R.; Nezeloff, C. (Hopital Saint-Vincent-de-Paul, 74, ave. Denfert Rochereau, 75674 Paris Cedex 14, France). *Ann. Chir. Infant.* 17(5/6):330-347; 1976.

Pathoanatomical studies of primary liver tumors in children, including 35 benign tumors and 58 malignant tumors, were made using the histopathological records. Benign tumors could generally be classified as hamartomas (HA) because whatever the degree of differentiation or macroscopic appearanc they always possessed several tissue components. The studies revealed that benign tumors were comprised of solitary angiomas (8), multicomponent HA (13), fibroblastic HA (7), angiomyoxoid HA (4), and a lymphangioma (1). The malignant tumors either sarcomatous or blastomatous, had a varied morphology. In some cases, only part of the orga was invaded. Hepatoblastomas (HB) were observed in 46 cases, and in 32, blastomatous tissue was present. The histopathology of the HB varied. Many contained erythropoietic cells or angioform mesenchymatous islets. Biopsy samples from HB patients revealed were inconclusive. Hepatocarcin mas, which were seen in eight patients, were characterized by differentiated trabecular or cana trabecular proliferation.

5016 EARLY DIAGNOSIS OF CARCINOMA OF THE HEPATIC DUCT. (Ger.) Cueni-Heer, E.; Cuer

B.; Schmid, M. (Medizinische Klinik, Stadtspital Waid Tiechestr. 99, CH-8037 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):534-537; 1977.

The clinical symptoms and course of carcinoma of the hepatic duct in eight patients are presented. A retrospective study of the eight patients showe that all presented with upper abdominal pain with an anicteric period of 2-23 months prior to diagnosis. Six patients had short, intermittent episodes of diarrhea, two had weight loss, and one had pruritus during the anicteric period. A slightly enlarged liver was seen twice, six had occult blood in the stool, and only one patient h a persistently elevated alkaline phosphatase leve in the anicteric stage. However, in the icteric stage, all patients had enlarged livers, pruritus nausea, and rapid deterioration in condition. Li chemistry was inconsistent. Liver biopsies in th anicteric stage showed cells with feathered degeneration of the cytoplasm (pseudoxanthoma cells), indicative of longstanding cholestasis. These ce were also found in three biopsies during icterus. Upon diagnosis, the carcinoma had infiltrated the hepatic parenchyma in all patients, and in seven stances, it had encircled the hilar vessel struct Two patients had a hepaticojejunostomy, and a bil duct prothesis was inserted in five others; one patient had no surgery. All patients died 2-32 m after diagnosis of gallbladder complications, hemato-bilia, or cachexia.

5017 PROBLEMS OF THE DIAGNOSIS OF LIVER TUMORS IN HEPATOMEGALY. (Fre.) Dommergues, J. P. (Service d'Hepatologie Infantile, Hopital Parrot, Bicetre, 94, Le Kremlin Bicetre, France). *Ann. Chir. Infant.* 17(5/6):353-356; 1976.

Problems in diagnosing pediatric hepatic hypertrophy (HH) presumed to be of tumoral origin are discussed. An isolated nodular mass should be distinguished by its palpatory features and differentiated from the neighboring hepatic parenchyma. If HH has affected the entire lobe, certain diagnostic traps have to be avoided, and the following should be taken into consideration: the frequent asymmetry of cirrhosis and the existence of congenital atrophy of the left lobe with rare, compensating physiological hypertrophy of the right lobe. If the liver is enlarged and more or less irregular and nodular in shape, cirrhosis, glycogenosis, and secondary hepatic tumors should be excluded. In infants, the discovery of a very large abdominal mass can complicate the diagnosis. Should cardiac insufficiency also be present, hepatic or multinodular hemangiomatous angioma may be diagnosed. Hematological abnormalities such as anemia, hyperthrombocytopenia, and thrombopenia should also be considered. Hepatic function tests are only slightly disturbed in primary liver tumors. In some instances, measurement of urinary catecholamines has verified the presence of sympathoblastoma, whereas a positive α-fetoprotein test has been indicative of hepatoblastomas in children <2 yr of age and in certain cases of metabolic cirrhosis, which may include tyrosinosis and Wilson's disease.

5018 POSSIBLE MANIFESTATIONS OF MALIGNANT TUMORS OF THE LIVER. (Fre.) Juskiewenski, . (No affiliation given). *Ann. Chir. Infant.* 17(5/6):430-432; 1976.

The possible manifestations of malignant tumors of the liver (LT) are reviewed. The association of LT with certain congenital malformations of the urogenital, digestive, or circulatory systems is not valid statistically. Eight cases of congenital hemihypertrophy have been reported, and it has also been observed in Wilms' tumor and adrenal tumors. The association of LT with delayed puberty in a young adult has been documented by only two authors, whereas association of LT with a virilization syndrome has been reported frequently. The virilization syndrome is characterized by acceleration of bony maturation and a marked increase of urinary gonadotropin levels. This syndrome has not been observed in girls.

5019 PARTICULAR ASPECTS OF LIVER TUMORS. SECONDARY LIVER TUMORS. (Fre.) Schweisguth, O.; Zucker, J. M. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):390-398; 1976.

The specific aspects and therapeutic results of neuroblastoma with hepatic metastases in 37 children are reported. Hepatomegaly occurred in the first months of life, nearly always before 6 months. The liver was usually solid; no icterus was present. The urinary catecholamine level was highly elevated in all of the children. I.v. urography revealed displacement of the kidney by a thoracic tumor in two children and by a cervical tumor in one. Treatment usually consisted of radiotherapy (1,000 rads) to the liver over 10-15 days, followed by alternating chemotherapy with vincristine (1.5 mg/m^2 i.v.) every 2 weeks and cyclophosphamide (300 mg/m^2 i.v.) during the intermediate weeks. This was continued until the urinary catecholamine levels returned to normal. Five children died <10 days after hospitalization, but 11 survived >5 yr, 8 >2 yr, and 4, 1-4 yr. Seven of the patients died after 2 months to 6 yr of tumor recurrence, most often of the ganglia or skeleton and less frequently of the liver.

5020 CLINICAL ASPECTS OF INTRAHEPATIC BILE DUCT CARCINOMA INCLUDING HILAR CARCINOMA: A STUDY OF 57 AUTOPSY-PROVEN CASES. (Eng.) Okuda, K.; Kubo, Y.; Okazaki, N.; Arishima, T.; Hashimoto, M.; Jinnouchi, S.; *et al.* (Chiba Univ. Hosp., Chiba, Japan). *Cancer* 39(1):232-246; 1977.

The clinical features of 57 autopsied cases of intrahepatic bile duct carcinoma, including 28 cases of the peripheral type (cholangiocarcinoma) and 29 cases of the hilar type, were compared with those previously reported for hepatocellular carcinoma. Among the 57 cases, the male/female ratio was 1.7:1, whereas that of hepatocellular carcinoma was 7.2:1. The average age of the patients was 62.2 yr, almost 10 yr older than that for hepatocellular carcinoma (53.8 yr). Jaundice was more frequently the initial presenting symptom in bile duct carcinoma (26.3%) than in hepatocellular carcinoma (0.8%). Ascites were present in 15.8% and 49.3% of patients with intrahepatic bile duct carcinoma and hepatocellular carcinoma, resp. Hepatomegaly occurred in only 50.8% of patients with bile duct carcinoma, whereas it was more frequent in hepatocellular carcinoma. Splenomegaly was absent in all cases of bile duct carcinoma, whereas it occurred in 16.4% of patients with hepatocellular carcinoma. Signs of portal hypertension were absent or minimal in the patients with intrahepatic bile duct carcinoma, and extrahepatic metastases were less frequent than in hepatocellular carcinoma. The clinical course of the hilar type of intrahepatic bile duct carcinoma resembled extrahepatic bile duct carcinoma; that of the peripheral type was between the latter and hepatocellular carcinoma. The major diagnostic procedures employed included percutaneous transhepatic cholangiography, endoscopic retrograde cholangiography, liver scanning, celiac angiography, laparoscopy, liver biopsy, exploratory laparotomy, and blood chemistry. The overall rate of histologically correct diagnosis was 31.5%. The diagnosis became more accurate in cases after 1970, particularly in the hilar type, due to the development of direct cholangiographic techniques and alpha-fetoprotein determination. Two illustrative cases are presented, including one patient with a hilar carcinoma who survived for over 2 yr after transhepatic biliary drainage.

5021 BIOPSY FINDINGS OF LIVER PARENCHYMA IN THE PRESENCE OF METASTASIS.

(Ger.) Dirschmid, K. (Institut fur Pathologie, Carinagasse 49, A-6807, Feldkirch, Austria). *Zentralbl. Allg. Pathol.* 121(3):225-228; 1977.

The morphological changes seen in 107 liver biopsies with metastatic tumor infiltration are presented. Nonspecific reactive hepatitis was observed in almost 50% of the specimens, whereas passive hyperemia (9 focal, 3 with necroses, 2 atrophy) was seen in 30%. Other liver findings included necroses (35 times), compression (23), intrasinusoidal granulocytic concentration (16), pure tumor tissue (12), scars (11), little tumor tissue (7), cholestasis (6), myeloid metaplasia (1), concurrent secondary biliary cirrhosis (1), stationary cirrhosis (1), and alcoholic fatty liver (1). The case of myeloid metaplasia was attributed to widespread metastases of the skeletal system. The frequent nonspecific reactive hepatitis can be attributed to the tumor metabolism and immunological reaction to the tumor tissue, which was most intense in the proximity of the tumor. Granulocytic intrasinusoidal accumulations can be considered as leukotactic reactions to tumor necrosis. Overall, the detection of metastases was unexpected in 14% of the biopsies. The results prove the usefulness of liver biopsies in detecting unexpected liver metastases.

5022 IMMUNOPATHOLIGICAL ASPECTS OF LIVER CIRRHOSIS.

(Ger.) Meyer zum Buschenfelde, K. H. (II. Medizinische Klinik, Klinikum der Johannes-Gutenberg-Universitat, Langenbeckstrasse 1, D-65 Mainz, W. Germany). *Z. Gesamte Inn. Med.* 32(1):10-16; 1977.

The immunopathological aspects of hepatobiliary diseases are reviewed. Acute viral hepatitis B was found to progress to chronic active or persisting hepatitis or liver cirrhosis in about 4-11% of all cases, especially if hepatitis B surface antigen (HBsAg) persisted for >13 weeks. With the immune system being unable to reject the virus and virus-infected cells, the infected cells underwent transformation, followed by the appearance of virus antigens on the cell surface and autoimmune reactions. Sudden cure was observed in some cases of chronic active hepatitis with long-term HBsAg after HBsAg and hepatitis B core antigen were eliminated from the serum and tissue upon transition of the disease into liver cirrhosis. Excessive hypergammaglobulinemia, persistently high IgG levels, antinuclear antibodies, cellular immunity to membrane antigens, antimembrane autoantibodies, and histocompatibility antigen 8 are found in autoimmune chronic active hepatitis. Circulating antinuclear antibodies in patients with drug-induced chronic hepatitis and liver cirrhosis indicate the involvement of immunological mechanisms. The presence of antimitochondrial antibodies and associated autoimmune diseases (Sjogren's syndrome, chronic polyarthritis, rheumatoid arthritis, and autoimmune thyroiditis) in primary biliary cirrhosis indicate
that it is a special form of immunological liver disease. Unlike other localized and generalized autoimmunopathies, it is not influenced by immunosuppressive therapy.

5023 AMINOPYRINE METABOLISM IN THE PRESENCE
HYPERBILIRUBINEMIA DUE TO CHOLESTASIS O
HEPATOCELLULAR DISEASE: COMBINED USE OF LABORATOR
TESTS TO STUDY DISEASE-INDUCED ALTERATIONS IN DRUG
DISPOSITION.

(Eng.) Hepner, G. W.; Vesell, E. S.
(Univ. California at Los Angeles/Harbor General Hosp., Torrance, CA 90509). *Clin. Pharmacol. Ther*
21(5):620-626; 1977.

The aminopyrine breath test (ABT) was performed in
patients with hyperbilirubinemia to determine why cholestasis has variable effects on hepat
aminopyrine metabolism. Hyperbilirubinemia (total
serum bilirubin >1.2 mg/100 ml) in these patients
was due to hepatocellular disease (77 cases) or ch
estasis (40 cases). The ABT, defined as the percentage of the administered dose of ^{14}C excreted i
breath for 2 hr after [^{14}C]aminopyrine administration, was 6.2 ± 0.8% in 107 control patients with
normal total serum bilirubin. The ABT was severel
abnormal (<3.1%) in 54/77 hyperbilirubinemic patients with hepatocellular disease and normal (>4.5%) in only 5 of these patients. In contrast, the ABT was severely abnormal in only 1 of
40 cases of cholestasis with hyperbilirubinemia a
normal in 70% of these patients. Thus, aminopyri
metabolism is normal in most cases of hyperbiliru
inemia due to cholestasis and is only rarely seve
ly abnormal in these patients. Severe abnormalit
in aminopyrine metabolism occurs in the majority
patients with hyperbilirubinemia due to hepatoce
lar disease. It appears that the ABT may be usef
to distinguish patients with hyperbilirubinemia d
to cholestasis from most patients with hyperbilir
binemia due to hepatocellular disease.

5024 INTRAHEPATIC CHOLESTASIS IN CHILDHOOD.

(Eng.) Heathcote, J.; Deodhar, K. P.;
Scheuer, P. J.; Sherlock, S. (Royal Free Hosp., P
St., London, NW3 2QG, England). *N. Engl. J. Med.*
295(15):801-805; 1976.

The clinical course, histologic features, and pos
ble etiologic factors in 17 children with cholest
in the neonatal period were studied. During a fo
low-up period of 5 months to 22 yr, all had signs
of chronic cholestasis, but only 4 died (2 from n
hepatic causes); the others live remarkably norma
lives. Serial hepatic biopsies in 11 showed a va
iety of initial lesions, which progressed to hypo
plasia of the intrahepatic bile ducts; increasing
evidence of possible viral infection was found i
only 10 cases; a hepatitis, beginning either bef
or after birth, appears to be a likely original
cause. The histologic changes may represent dif
ent stages of one process, starting as cholestas
with or without evidence of hepatitis and progre

sing to obliteration or failure of normal growth of the intrahepatic bile ducts.

5025 METABOLISM OF HYPNOTIC AND SEDATIVE DRUGS IN CHOLESTASIS. (Ger.) Denk, H. (Pathologisches-Anatomisches Institut der Universitat Wien, Spitalgasse, A-1090 Vienna, Austria). *Z. Gastroenterol.* 6(15):373-377; 1977.

The biotransformation of hypnotic and sedative drugs was found to be impaired in cholestatic rats and rabbits. Hexobarbital and pentobarbital sleeping times were significantly prolonged in these ligated animals. In the rat, ligation of the bile duct resulted in a biochemically and morphometrically tangible increase in the rough and smooth endoplasmic reticulum of the liver cells. The endoplasmic reticulum was hypoactive with respect to drug metabolism, a condition partially due to decreased glucose-6-phosphatase activity in the endoplasmic reticulum and decreased cytochrome P-450 content in the microsomes. Tests with microsomes of cholestatic rats showed a mixed competitive-noncompetitive inhibition during aminopyrine degradation that depended on the age of the animal. Drug elimination was also altered in cholestatic patients. The half-life of serum pentobarbital was lengthened in patients with mechanically-induced cholestasis, but the half-life of meprobamate was not changed significantly. Similarly to test animals, the cytochrome P-450 content in the liver homogenates of patients with cholestasis and choledocholithiasis was decreased significantly. *In vitro* studies with liver specimens from these patients also showed a markedly reduced metabolism of hypnotics and sedatives.

5026 HEPATIC ENCEPHALOPATHY AND REYE'S SYNDROME. (Eng.) Partin, J. C. (No affiliation given). *Pediatr. Ann.* 6(5):101-113; 1977.

The clinical and biochemical features of Reye's syndrome (RS) are contrasted with those of hepatic encephalopathy (HE) of fulminant hepatitis. Reye's syndrome is an acute complication of an otherwise trivial childhood viral infection, and most cases of RS masquerade briefly as gastroenteritis. Usually, clear signs of encephalopathy develop within hours of the onset of vomiting in RS, in contrast to HE where the signs of hepatitis usually precede the onset of encephalopathy by days or weeks. Jaundice is absent in RS patients and is usually present on admission in HE patients. The liver size is normal or considerably enlarged in RS and may be impalpable in HE. Fetor hepaticus is absent in RS and is usually present in HE. The liver biopsy of RS is yellow or white and very fatty, as opposed to a green nonfatty specimen in HE. Biochemically, the bilirubin value is less than 3.5 in RS, in contrast to a value of more than 5 in HE. The blood sugar of RS patients may be hypoglycemic and readily correctable; hypoglycemia in HE may be profound and difficult to correct. In both RS and HE, the SGOT and SGPT levels are elevated and variable. Ammonia levels are elevated in RS before treatment and normalize rapidly with treatment; in HE, the ammonia levels are unpredictable. Prothrombin time, which is prolonged in both RS and HE, is easily corrected in RS and may be difficult to correct in HE. Disseminated intravascular coagulopathy (thrombocytopenia) is absent in RS and may be present in HE. The liver lesion in RS is almost always completely reversible in patients treated by exchange transfusion or by glucose infusion. The mortality for hospitalized cases of RS is about 40%, although this has been reduced to 20% by the use of special treatment teams.

5027 THE ROLE OF THE FALSE NEUROTRANSMITTER OCTOPAMINE IN THE HYPOTENSION OF FULMINANT HEPATIC FAILURE. (Eng.) Trewby, P. N.; Chase, R. A.; Davis, M.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5 9RS, England). *Clin. Sci. Mol. Med.* 52(3):305-310; 1977.

The mechanism of unexplained hypotension in fulminant hepatic failure was studied in 23 patients. Serum octopamine, systemic peripheral resistance, the pressor response to tyramine infusions, and the sensitivity of the peripheral vessels to released noradrenalin were assessed. Seventeen patients became hypotensive during hepatic failure, with a systolic blood pressure of less than 80 mm Hg, which was not accounted for by hemorrhage or septicemia. The mean peripheral resistance in the eight hypotensive patients studied (1.93 ± 0.23 kPa min/$1/m^2$) was significantly lower than that in nine patients who were normotensive (2.91 ± 0.29 kPa min/$1/m^2$). Compensatory tachycardia was not observed in the hypotensive patients, and their mean heart rate was significantly slower than that in the normotensive patients (93.7 ± 5.0/min and 108.7 ± 3.3/min, resp., $p<0.02$). Serum octopamine concentrations were raised in both normotensive and hypotensive patients, with a mean value for the entire group of 17.63 ± 0.85 nM, compared with 11.43 ± 1.24 nM in controls ($p<0.001$); the highest concentrations were found in the normotensive patients. The pressor response to tyramine (3, 6, and 9 mg, i.v., 18 patients) did not differ significantly from control subjects or between the normotensive and hypotensive patients. The pressor response to noradrenalin (3, 6, and 9 µg) was not significantly different in the controls, normotensive, and hypotensive patients. Only one patient who developed hypotension recovered conciousness, while five of the six patients remaining normotensive recovered. The results suggest that neither increased serum concentrations of the false neurotransmitter octopamine nor end-organ insensitivity to released noradrenalin are responsible for the hypotension. A more likely explanation is toxic depression of the vasomotor center.

5028 ARTIFICIAL SUPPORT SYSTEMS FOR LIVER FAILURE. (Eng.) Berk, P. D.; Scharschmidt, B. F.; Martin, J. F.; Plotz, P. H. (Building 10, Room 4D52, DDB:NIAMDD, Natl. Inst. Health, Bethesda, MD 20014). *Kidney Int.* 10(Suppl. 7):S233-S238; 1976.

Approaches to the development of an artificial hepatic support system are reviewed. The application of such a device presently appears to be limited to short-term use in potentially reversible acute hepatic failure. The experimental artificial liver devices include hemodialysis, hemoperfusion through sorbents, affinity chromatography, biologically active adsorbents, and hemoperfusion through liver cells in tissue culture. Conventional hemodialysis results in an approximate 50% survival rate. Since the toxins responsible for hepatic coma are among the "middle molecules," which are not efficiently removed by this procedure, the development of hollow fiber artificial kidneys capable of clearing substances with molecular weights up to 5,200 is of potential interest. Hemoperfusion through charcoal effectively removes many middle molecular weight molecules, but does not remove nondialyzable, tightly protein-bound materials, such as bilirubin. Although hemoperfusion through resins has been employed in the treatment of drug overdose, the striking losses of WBC (60-80%) and platelets (60-98%) noted in animal and clinical trials has not encouraged their widespread use in hepatic failure. Affinity chromatography with albumin-agarose gel effectively removes bilirubin, indocyanine green, BSP, certain bile acids, and some albumin-bound drugs from whole blood or plasma *in vitro*. To the extent that tightly albumin-bound substances play a role in hepatic coma, albumin-agarose gel hemoperfusion may be of potential value as a component of a temporary hepatic support system for acute liver failure. Detoxification by extracorporeal circuits containing columns of biologically active materials has been occasionally described with gel-entrapped hepatic microsomes and with solubilized, carrier-bound hepatic enzymes. Hemoperfusion through liver cells in tissue culture has been described, but limitations of both capacity and scale may be obstacles to its clinical application. None of the approaches tested clinically has conclusively proved to be beneficial in fulminant hepatic failure. Further understanding of basic organ physiology and of the pathophysiology of organ failure is necessary.

5029 HEPATIC HAMARTOMA (32 CASES, ANGIOMATOUS AND LYMPHANGIOMATOUS HAMARTOMAS EXCLUDED).

(Fre.) Nihoul-Fekete, C. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):399-423; 1976.

The macroscopic appearance, clinical study, and treatment of 32 children with hepatic hamartomas (HT) are presented. Some HT (15/32) had a cystic appearance and large volume, and 21 were superficial. According to the vascular segmentation, 18 HT were on the right side of the liver, 10 on the left, and 2 were in the center. One case of multiple biliary adenoma and one of multinodular adenoma were also observed. A clinical study showed that of 30 HT (excluding 2 diaphragmatic hernias), 17 originated in the liver and 3 in the spleen. Topography resulted in a false diagnosis in two patients, and technetium scintigraphy did not differentiate an intraparenchymatous lacuna from compression images caused by a neighboring tumor. A biopsy of the 17 solid tumors revealed 8 adenohamartomas, 4 cholangiohamartomas, and 5 composite HT. Three children died before surgery could be undertaken, but 29 underwent surgery. Eight patients underwen a typical hepatic exeresis, seven were cured, and one died of anesthetic complications. All 13 patients whose tumors were excised were cured. Right hepatectomies were performed in five childre with large solid tumors, but two died. Internal drainage with a Y loop was performed in one child months after external drainage (marsupialization) central biliary cyst complicated by a fistula. H cured 8 yr later. Exeresis could not be performe in two children, and they are still alive after 5 and 14 yr. In view of the serious nature of this histologically benign tumor (6/32 died), surgical intervention should be attempted.

5030 GIANT MULTIFOCAL CAVERNOUS HEMANGIOMA O THE LIVER WITH PHLEBOLITHS.

(Ger.) Ho U.; Friedrich, M.; Sorensen, R. (FU Berlin, Klinikum Steglitz, Hindenburgdamm 30, D-1000 Berlin 45, W. Germany). *Radiologe* 17(2):77-82; 1977.

A giant, multifocal, cavernous hemangioma of the liver with phleboliths was diagnosed in a 31-yr-o man. The fluid-filled, space-occupying formation was diagnosed by sonography and liver angiography (selective angiography of the hepatic artery, ret grade angiography of the hepatic vein, and indire angiography of the portal vein via the splenic ar tery and superior mesenteric artery). Retrograde angiography of the hepatic vein is of great diffe ential diagnostic value.

5031 DIAGNOSIS OF HYDATID CYST OF THE LIVER.

(Fre.) Carcassonne, M.; Aubrespy, P. (No affiliation given). *Ann. Chir. Infant.* 17(5 395-398; 1976.

The diagnostic results of 70 hydatid cysts (HC) the liver in 24 girls and 14 boys are presented. Twenty of the patients with HC also had liver tumors. The hydatid cysts were located on the right side of the liver in 25 children, on the left in 9, and bilaterally in 4. With the except of one case, no overall hepatomegaly was noted, a mass of variable hardness was obvious. It occu red singly in 18 patients and multiply in 20. I was the main symptom in all patients and was som times associated with a high body temperature. Ten children, who had no liver tumors, presented with classical symptoms of appendicitis or a tum of the right hypochondrium. Echography was used to localize the large cysts, but, like scintigra it was not capable of detecting smaller ones. Splenoportography, however, accurately defined t appearance, number, localization, and portal con nection of the cysts. Cavography was recommende along with splenoportography to delineate the ve cava and the subhepatic circulation.

5032 TREATMENT OF HYDATID CYST.

(Fre.) Aubrespy, P.; Carcassonne, M. (No affi ation given). *Ann. Chir. Infant.* 17(5/6):470-4 1976.

The treatment of 38 patients with 61 hydatid cysts (HC) by total (31) and subtotal (3) cystectomy, pericystectomy (15), cystoresection (4), and external drainage (8) are reported. During these procedures the following complications developed: intracavitary effusion (3), purulent subdiaphragmatic abscess (1), and secondary echinococcosis (1). Overall, surgery for HC is less burdensome in children than in adults.

5033 FOCAL NODULAR HYPERPLASIA OF THE LIVER. REPORT OF TWO CASES IN ADULTS. (Fre.) Arnaud, J. P.; Weill-Bousson, M.; Adloff, M.; Imler, M. (Service de Chirurgie du Centre medico-chirurgical, 19, rue L. Pasteur, F 67300 Schiltigheim, France). *Arch. Fr. Mal. App. Dig.* 65(5): 397-403; 1976.

The diagnosis and surgical treatment (hepatic resection) of two patients with focal nodular hyperplasia (FNH) of the liver are presented. One patient had only pain in the right lumbar cavity and normal liver function tests. However, arteriography of the celiac trunk revealed tumoral formation of the right liver lobe with malignant hypervascularization, plus an incomplete nephrogram of the right kidney. Surgery revealed a tumor, and a right hepatectomy was performed successfully. Histology demonstrated FNH of the liver. The other patient presented with intense icterus associated with asthenia, anorexia, and elevated transaminase levels. Despite vitamin therapy, the patient developed hepatic encephalopathy with complete coma, disturbed EEG, increased arterial ammonia level, and a breakdown of coagulation factors. The patient became conscious 4 days later following treatment with antibiotics, corticoids, and an injection of human anti-Australian immunoglobulins. The icterus and cytolysis diminished gradually, but this was followed by edematous ascitic decompensation with a new surge of icterus. Biological tests finally became normal, and the general condition improved after corticoid treatment. A subsequent hepatic biopsy revealed the start of posthepatic cirrhosis, liver function tests were abnormal, and arteriography of the celiac trunk and hepatic artery showed a polycyclic lacuna in the right lobe. Surgery revealed five irregular and nodular formations in the hepatic parenchyma. Anatomic-pathological examination of the tissue revealed a thin sheet of hepatocytes encircling the nodules, but no sign of malignancy.

5034 ULTRASTRUCTURAL RESULTS IN LIVER BIOPSIES OF PATIENTS WITH HYPERLIPOPROTEINEMIA. (Ger.) Kemmer, C.; Henefeld, M. (Pathologisches Institut, Medizinische Akademie "Carl Gustav Carus," Fetscherstrasse 74, DDR-8019 Dresden, E. Germany). *Zentralbl. Allg. Pathol.* 121(3):243-253; 1977.

Electron microscopy findings of liver biopsies from 24 patients with types IIa-V endogenous hyperlipoproteinemia (HLP), 7 patients with steatosis hepatitis, and 6 healthy controls are presented. Liver cells of type IIa HLP patients showed marked proliferation of the smooth endoplasmic reticulum and mitochondria with some atypical cell membrane, paracrystalline matrix inclusions, or fibrillar matrix condensation. In addition to the proliferation of smooth membrane, type IIb patients also showed more severe alterations of liver cells, depending on the degree of fatty degeneration. Sporadic giant mitochondria, paracrystalline matrix inclusions, and myelin-type degeneration foci appeared in the mitochondria. Type III specimens showed marked hydration of the cytoplasm of hepatocytes, as well as increased deposits of larger neutral fatty drops. Stronger changes were seen in the Golgi areas, with vacuolization of the membrane parts and accumulation of lipidic substances of various density and structure in the cisternae and larger vesicles. In type IV biopsies, irregular structures of the liver cells predominated, along with marked dilation of the membrane of the endoplasmic reticulum. Polymorphy of the mitochondria was conspicuous, combined with frequent rearrangement of the cristae and myelin-type membrane degeneration. Organelles with dense, partial, fibrillar structured matrixes were pronounced. More severe defects of the liver cell membrane and endothelium were seen in type V HLP. All these patients showed mitochondrial polymorphy, with partial bizarre shaped organelles, atypical cell membrane, and paracrystalline matrix inclusions. The hyperplastic Golgi areas contained vesicles with lipoprotein particles and electron-dense aggregates and myelin-type structures. Patients with type III-V HLP and concomitant diabetes mellitus had glycogen in liver cell nuclei, in addition to more fatty- and glycogen-rich liver cells. A fine structural differentiation between findings in HLP plus steatosis hepatitis and fatty liver without HLP could not be made. No significant liver findings were noted in the controls.

5035 DIAGNOSIS OF CHOLESTATIC JAUNDICE IN INFANTS. DISCRIMINATORY STUDY OF 288 CASES. (Fre.) Eliot, N. (INSERM U-56, Hopital d'Enfants, 78, rue du General-Leclerc, F 94270 Le Kremlin-Bicetre, France). *Biol. Gastroenterol. (Paris)* 9:338-339; 1976.

To aid in determining the type of surgery to be performed in 288 children with cholestatic jaundice, a discriminatory study was made to distinguish between the extrahepatic and intrahepatic forms of the disease. A comparison of four variables, including stool color after 10 days of observation, birth weight, age at the time of stool discoloration, and clinical features of the liver, yielded correct findings in 82% of the cases. When four histological variables were added to these parameters, the cholestasis was classified correctly in 85% of the cases. Needle biopsy provided no substantial aid in determining the type of surgery.

5036 SPLENIC PSEUDOSINUSES AND HEPATIC ANGIOMATOUS LESIONS: DISTINCTIVE FEATURES OF HAIRY CELL LEUKEMIA. (Eng.) Nanba, K.; Soban, E. J.; Bowling, M. C.; Berard, C. W. (Hiroshima Univ.

Sch. Medicine, Hiroshima, Japan). *Am. J. Clin. Pathol.* 67(5):415-426; 1977.

Tissues from 14 resected spleens from patients with hairy cell leukemia were examined for the presence of splenic pseudosinuses and hepatic angiomatous lesions. In all 14 spleens there were variably prominent distended spaces filled with RBC and resembling dilated sinuses. These structures appeared to be lined by hairy cells, and histochemical and enzymatic studies confirmed that they were pseudo-sinuses lacking the endothelial cells and ring fibers of normal splenic sinuses. These changes were not present in 4 normal spleens or in 10 spleens involved by other types of chronic leukemia, and appear to be qualitatively specific for hairy cell leukemia. In three of five hepatic biopsies, similar angiomatous lesions were present in multifocal clusters resembling hemangiomas. Their pathogenesis may be related to possible adherence of hairy cells to reticulum fibers in involved tissues.

5037 HEPATIC LYMPHANGIOMAS.

(Fre.) Debeugny, P. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):419-423; 1976.

Three cases of hepatic lymphangiomas in children are presented. The first symptoms were noted between the ages of 6 and 18 months, and they included emesis, high body temperature, abdominal pain, and poor general condition. Hepatomegaly, the major symptom, was indolent in all three children. Radiology revealed digestive and renal opacification that showed only indirect signs of compression. Cholangiography in one patient revealed compression of the bile duct and gallbladder. Hepatic arteriography in two patients showed compression of the trunk and branches of the right hepatic artery. An α-fetoprotein test in two of the children was negative. Laparotomy with total excision of lesions was undertaken in two patients, and was extended to thoracophrenicectomy in one. The third patient underwent partial excision of the lesions. At 1-yr follow-up, the hepatic parenchyma was normal in two of the children. Postoperatively, persistent lymphatic drainage and hypogammaglobulinemia, which led to repeated infections, occurred in the third. When seen 3 yr later, he was still very susceptible to infection.

5038 HEPATIC DYSFUNCTION FOLLOWING TRAUMA: EXPERIMENTAL STUDIES.

Sarfeh, I. J.; Balint, J. A. (Albany Medical Coll., ME602 Dept. Surgery, Albany, NY 12208). *J. Surg. Res.* 22(4): 370-375; 1977.

To study the pathophysiology of post-traumatic hepatic dysfunction, male Sprague-Dawley rats were subjected to repeated deceleration injury under light ether anesthesia and the consequent hepatic and hemodynamic alterations were determined. Glycocholate infusion (7 mM, 2 ml/hr) enhanced bile flow and bile salt output in comparison to control values both before trauma (bile flow increased from 0.17 ± 0.02 to 0.27 ± 0.03 ml/hr/g liver and bile salt output increased from 1.19 ± 0.41 to 6.13 ± 1.30 μmol/hr/g liver) and after trauma (from 0.05 ± 0.01 to 0.09 ± 0.03 ml/hr/g for bile flow and from 0.55 ± 0.23 to 1.45 ± 0.44 μmol/hr/g for bile salt output). After trauma and a recovery period from the anesthesia, the total bile flow and bile salt output decreased significantly in both the saline-infused ($p<0.001$ and $p<0.01$) and glycocholate-infused animals ($p<0.01$ in both cases). The bile salt-independent fraction also decreased significantly following trauma (from a pretrauma value of 0.14 ± 0.02 ml/hr/g liver to 0.04 ± 0.02 ml/hr/g). The hepatic clearance rate of ^{3}H-glycocholate decreased significantly in the rats undergoing trauma, the half-time of disappearance increasing from 37 ± 2.9 to 53 ± 1.8 sec. Bile flow remained significantly below control levels for at least 6 hr in saline-infused animals but returned to control values by 24 hr. Sinusoidal hepatic blood flow behaved similarly to bile flow, but mean systemic arterial pressure returned to normal levels by 15 min after trauma following an initial fall. Hepatic ^{131}I-colloid lipid emulsion uptake was lower than control values after trauma but returned to near control values by 6 hr. Hematocrit and whole blood and plasma viscosity were not significantly affected by trauma. One hour after trauma, the livers showed centrilobular congestion and separation of liver cell cords by edema; these changes were still present at 24 hr. The results suggest that post-traumatic hepatic dysfunction results from hepatic ischemia due to altered splanchnic hemodynamics in shock.

5039 VENO-OCCLUSIVE DISEASE OF THE LIVER ASS
CIATED WITH ORAL CONTRACEPTIVES: CASE REPORT AND REVIEW OF THE LITERATURE.

(Eng.) Alpert, L. I. (Mt. Sinai Sch. Medicine, New York, NY). *Hum. Pathol.* 7(6):709-718; 1976.

The case of a 36-yr-old woman in whom veno-occlus
liver disease occurred after she had taken oral
contraceptives for 3 yr is reported. The patient
presented with ascites, occasional spider angioma
on the upper torso, whitened palms, and hepatospl
omegaly. Her prolonged course (1.5 yr from onset
symptoms until death) closely mimicked that of
chronic active hepatitis with progression to cirr
sis. In conflict with that diagnosis was the rel
tively minor alteration of liver function tests
(particularly the normal serum globulin level and
protein electrophoresis pattern), despite the dev
opment of portal hypertension with recurrent asci
The latter failed to improve after portacaval shu
Liver biopsies revealed severe central congestion
with progressive central fibrosis and prominent
sinusoidal engorgement resembling peliosis hepati
The presence of the well encapsulated adenomatous
nodule was interpreted at the time as evidence of
cirrhosis, further obfuscating the process of a
Budd-Chiari syndrome. Only at autopsy was the
widespread obliterative process involving central
sublobular, and hepatic veins observed. The typi
venous lesion was characterized by profound intin
proliferation and fibroplasia. Occasional evider

of sublobular vein recanalization evidenced the chronicity of this process. An unusual feature was widespread hepatocellular calcification in the absence of an elevated serum calcium level.

5040 STUDY OF AN EPIDEMIC OF VENOOCCLUSIVE DISEASE IN INDIA.

(Eng.) Tandon, R. K.; Tandon, B. N.; Tandon, H. D.; Bhatia, M. L.; Bhargava, S.; Lal, P.; Arora, R. R. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Gut* 17(11):849-855; 1976.

An epidemic of veno-occlusive disease occurring among 25 residents in a tribal district in central India during a 10-month period is described. The disease was manifested by rapidly developing ascites, and 11 patients died before they could be studied. The six patients (ages 12-38 yr) that could be hospitalized were studied for 2-17 months. The onset of the illness was characterized by mild continuous pain in the right upper quadrant and epigastrium, followed within 7-15 days by a drop in urinary output and rapidly filling ascites. The clinical features suggested an outflow tract obstruction such as a Budd-Chiari-like syndrome or veno-occlusive disease. Radiographic and hemodynamic studies demonstrated a combination of post- and perisinusoidal blocks, excluding the possibility of hepatic or portal vein obstruction. Liver dysfunction was indicated by the presence of a marked BSP retention (normal in only one patient) and mild to moderate hypoalbuminemia. After the ascites had been relieved, hepatomegaly and splenomegaly were noted in four and three patients, resp. The initial liver biopsies revealed zonal, centrilobular hemorrhagic necrosis. Subsequent biopsies showed replacement of the centrizonal areas of necrosis with radiating scars that created a picture of reversed lobulation. Five patients improved within 3-4 months on symptomatic treatment. One patient developed hepatic encephalopathy and died. Necropsy revealed an 800-g liver with severe centrizonal scarring associated with variable thickening and hepatic vein occlusion. Central vein occlusion and extensive centrilobular fibrosis were also present. The authors suggest that a vasospastic process occurred in these patients resulting from either circulating or fixed tissue toxin (from food) that affected both sinusoids and central veins so as to produce outflow tract obstruction at multiple sites.

5041 HETEROGENEITY OF WILSON'S DISEASE IN ISRAEL.

(Eng.) Passwell, J.; Adam, A.; Garfinkel, D.; Streiffler, M.; Cohen, B. E. (Chaim Sheba Medical Center, Tel-Hashomer, Israel). *Isr. J. Med. Sci.* 13(1):15-19; 1977.

The distribution and patterns of Wilson's disease among various ethnic populations were studied in 50 Israeli patients. The patients included 35 Jews (12 Ashkenazic, 3 Moroccan, 3 Iraqi, 8 Yemenite, 8 Iranian, and 1 Turkish), 9 Arabs, and 6 Druzes. Onset of the disease by the age of 10 yr was found in all but one of the Arab and Druze patients, but only nine Jews presented with symptoms at such an early age ($p<0.001$). Most of the non-Jewish patients showed an early onset of cirrhosis and an often rapidly fatal course. Male patients predominated in the Arab and Druze groups (11/15) and female patients in the Jewish group (16/23 non-Ashkenazic Jews and 7/12 Ashkenazic Jews). Genetic analysis of 20 families (37 affected patients out of 115 siblings) confirmed an autosomal recessive mode of inheritance. The ages of onset within sibling pairs were significantly correlated ($r=0.675$, $p<0.01$). The first two affected children in the families with three affected siblings were included in this calculation. The ages of onset in the three families with three affected siblings were also very similar. In one family, the ages of onset were 8, 8, and 5 yr; in the second, 10, 13, and 10; and in the third, 8, 5, and 8 yr. The very similar age of onset and type of disease within sibships and the varying ages of onset noted between the Arab and Jewish patients suggest that this disease is genetically heterogeneous.

5042 A METABOLIC DISORDER SIMILAR TO ZELLWEGER SYNDROME WITH HEPATIC ACATALASIA AND ABSENCE OF PEROXISOMES, ALTERED CONTENT AND REDOX STATE OF CYTOCHROMES, AND INFANTILE CIRRHOSIS WITH HEMOSIDEROSIS.

(Eng.) Versmold, H. T.; Bremer, H. J.; Herzog, V.; Siegel, G.; Bassewitz, D. B.; Irle, U.; *et al.* (Univ. Children's Hosp., D-8000 Munchen 2, W. Germany). *Eur. J. Pediatr.* 124(4): 261-275; 1977.

Ultrastructural, histochemical, pathologic, and spectroscopic studies were carried out in a patient with a cerebro-hepato-renal syndrome resembling the Zellweger syndrome (ZS). The visceral manifestations were those of the ZS; however, the child had muscular hypertonia, and he survived longer than patients with ZS (until the 2nd yr of life). The hepatocytes lacked peroxisomes, but contrary to the findings in one patient with ZS, contained smooth endoplasmic reticulum. No catalase was detected histochemically or spectroscopically. The mitochondria had normal succinate and glutamate respiration, and normal coupling of respiration to the phosphorylation potential. The cytochrome content was diminished to one-third, and the redox pattern of the respiratory chain in the controlled state was abnormal; cytochromes b and c were 5% and 23% reduced, resp. The oxygen affinity of cytochrome a_3 was normal. The findings exclude a defect in the nonheme iron protein region of the respiratory chain as found in ZS, but suggest a functional abnormality of cytochrome b in this patient.

5043 THE ANGIOGRAPHIC EVALUATION OF HEPATIC MASS LESIONS BASED ON THE SEGMENTATION OF THE LIVER.

(Jpn.) Kusano, S. (Kitasato Univ. Sch. Medicine, Japan). *Nippon Acta Radiol.* 36(4):322-333; 1976.

5044 SURGICAL ANATOMY OF THE LIVER.

(Eng.) Kennedy, P. A.; Madding, G. F. (Stanford

Univ. Sch. Medicine, Stanford, CA). *Surg. Clin. North Am.* 57(2):233-244; 1977.

5045 MINIATURE LAPAROTOMY IN THE DIAGNOSIS OF HEPATOBILIARY DISEASES [Abstract]. (Fre.) Hay, J. M.; Blanc, D.; Preel, J. L.; Elman, A.; Hardouin, J. P.; Maillard, J. N. (Hopital Louis-Mourier, 92700 Colombes, France). *Gastroenterol. Clin. Biol.* 1(4):400; 1977.

5046 α_1-ANTITRYPSIN AND ITS ROLE IN THE DEVELOPMENT OF LIVER DISEASES. (Rus.) Mansurov, Kh. Kh.; Voznesenskii, N. K. (Scientific Res. Inst. Gastroenterology, Tadzhik SSR Acad. Sciences, Dushanbe, USSR). *Klin. Med. (Mosk.)* 54(11):19-24; 1976.

5047 IMMUNOGLOBULINS IN THE SERUM AND BILE IN CHRONIC DISEASES OF THE LIVER AND GALLBLADDER. (Rus.) Nizov, A. A. (Riazan' Medical Inst., Riazan', USSR). *Lab. Delo* (10):597-601; 1976.

5048 HEPATIC METASTASES OF DIGESTIVE TRACT CANCERS: DETECTION BY BIOLOGICAL TESTS. (Fre.) Lacaine, F.; Huguier, M. (Hopital Rothschild, 75012 Paris, France). *Gastroenterol. Clin. Biol.* 1(4):399; 1977.

5049 ACTUAL FEATURES OF PRIMARY LIVER CANCER (III). SOME DIAGNOSTIC FEATURES. (Spa.) Herrerias Gutierrez, J. M.; Jimenez Saenz, M.; Garrido Peralta, M. (Hospital Clinico Universitario de Sevilla, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(5):665-674; 1977.

5050 ULTRASONIC EXAMINATION OF THE LIVER. LIVER TUMORS. (Fre.) Floyrac, G.; Planiol, Th.; Mauleon, F.; Feil, C. (Service d'Exploration fonctionnelle par les Methodes physiques, C.H.U., 37000 Tours, France). *J. Radiol. Electrol. Med. Nucl.* 57(8/9):604-606; 1976.

5051 HORMONE-DEPENDENT LIVER CARCINOMA. DEMONSTRATION OF INTRATUMORAL HORMONE RECEPTORS [Abstract]. (Fre.) Monges, A.; Treffot, M. J.; Margin, P.; Girodroux, C.; Rampal, M. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):304-305; 1977.

5052 ANGIOGRAPHICAL AND SURGICAL NOTES ON CANCER OF THE HEPATIC HILUM. (Ita.) Ziviello, M.; Calise, F.; D'isa, L. (Ospedale A. Cardarelli, via Cardarelli, I-80131 Naples, Italy). *Radiol. Med. (Torino)* 63(1):23-31; 1977.

5053 ASSOCIATION OF CARCINOMA WITH CONGENITAL CYSTIC CONDITIONS OF THE LIVER AND BILE DUCTS. (Eng.) Bloustein, P. A. (Univ. Colorado Sch. Medicine, Denver, CO). *Am. J. Gastroenterol.* 67(1):40-46; 1977.

5054 OBSTRUCTIVE JAUNDICE SECONDARY TO HEPATOMA: CASE REPORT AND LITERATURE REVIE
(Eng.) Wind, G.; Futterman, S. (Mount Sinai Sch.
Medicine, City Univ. New York, Fifth Ave. and 100t
St., New York, NY 10029). *Am. J. Gastroenterol.* 67(1):80-83; 1977.

5055 RECURRENT BENIGN IDIOPATHIC INTRAHEPATI
CHOLESTASIS: REPORT OF ONE CASE. (Fre.
Convert, M. J. P. (Universita Claude Bernard, Lyo
France). *Rev. Fr. Gastroenterol.* (123):46-50; 19

5056 STUDY OF HEREDITY IN 106 FAMILIES WITH
HEMOCHROMATOSIS [Abstract]. (Fre.) Si
M.; Alexandre, J. L.; Bourel, M.; Hespel, J. P.;
baol, M. (Hopital Pontchaillou, Rennes, France). *Gastroenterol. Clin. Biol.* 1(4):403-404; 1977.

5057 ASSESSMENT OF THE LIVER FUNCTION IN PATIENTS WITH HEPATOCEREBRAL DYSTROPHY AN
THEIR RELATIVES. (Rus.) Il'ina, N. A.; Khokhlov
A. P.; Iasnova, N. N.; Burobin, V. A. (I. M. Sech
First Moscow Medical Inst., Moscow, USSR). *Sov.*
(5):95-99; 1976.

5058 THE HEPATORENAL SYNDROME. (Ita.) Trio
R.; Carelli, E.; Ramella, M.; Apicella,
P. (Martini Hosp., Via Talucchi, 22, 10143 Turin, Italy). *Minerva Med.* 68(26):1789-1808; 1977.

5059 ACUTE HEPATIC PORPHYRIA AS A DIAGNOSTIC
PROBLEM IN CHILDHOOD. (Ger.) Lernet,
Strehblow, M. (Landstr. 2, A. o. Krankenhaus, A39
Zwettl, Austria). *Paediatr. Paedol.* 11(3):554-55
1976.

See also, 4630, 4670, 4732, 4746, 4749, 4750, 475
4753, 4770, 4771, 4772, 4773, 4774, 477
4777, 4782, 4783, 4784, 4876, 4909, 515
5176, 5198, 5232, 5237, 5241, 5247.

Hyperbilirubinemic States

5060 LYSOSOMAL CHANGES IN LIVER TISSUE FROM PATIENTS WITH THE DUBIN-JOHNSON-SPRINZ SYNDROME. (Eng.) Seymour, C. A.; Neale, G.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 52(3):241-248; 1977.

The properties of the hepatic lysosomes of two patients with the Dubin-Johnson-Sprinz (DJS) syndrome were studied using analytical subcellular fractionation techniques, and the case reports of the patients are presented. Both patients, a 50-yr-old man and a 36-yr-old woman, were icteric and had abnormal BSP clearance (secondary rise to 58% and 20%, resp., at 2 hr). In both patients, all acid hydrolase activities (acid phosphatase, phosphodiesterase, α-glucosidase, α-galactosidase, α-mannosidase, *N*-acetyl-β-glucosaminidase, and β-glucuronidase) were elevated in comparison with those found in the liver biopsies of controls. When the distribution of lysosomal enzymes in the patients and controls was determined by fractionation, the acid hydrolase activity in the control subject mainly sedimented into the gradient, with broad peaks of activity extending over the density range 1.13-1.19; in the patients, most acid hydrolase activity remained in the sample layer and in the lighter part of the sucrose gradient. Melanin had a distribution similar to the lysosomal marker enzymes, suggesting that the lysosomes accumulate melanin. In a control subject, marker enzyme profiles showed clear separation of peroxisomes and mitochondria. There was no change in the distribution of peroxisomes or mitochondria in the patients. Although there are increased activities of lysosomal acid hydrolases in the liver tissue of these DJS syndrome patients, the integrity of these organelles is essentially normal and, therefore the accumulation of pigment would not be expected to initiate liver damage. The DJS syndrome is thus a benign type of secondary lysosomal storage disease.

5061 INDOCYANINE GREEN KINETICS IN NEWBORNS WITH NONHEMOLYTIC HYPERBILIRUBINEMIA. (Ger.) Heimann, G.; Roth, B.; Gladtke, E. (Universitats-Kinderklinik, Joseph-Stelzmann-Str. 9, D-5000 Koln 41, W. Germany). *Klin. Wochenschr.* 55(9): 451-456; 1977.

The kinetic patterns of indocyanine green (ICG) elimination from blood were determined after i.v. injection of the dye (2-4 mg/kg) in 22 newborns with nonhemolytic hyperbilirubinemia, 11 of whom were pretreated with phenobarbital (PH, 7.5 mg/kg/day x 5, p.o.). The other 11 newborns remained untreated and served as controls. Serum ICG was determined with a spectrophotometer. Average serum bilirubin concentration decreased significantly from 9.1 mg/100 ml to 4.7 mg/100 ml in the PH-treated newborns. Serum bilirubin concentrations did not change in the controls. PH-treated patients also had a significantly higher maximum elimination rate and Km (71.1 μM/min and 356.4 μM/min, resp.) than untreated controls (23.4 μM/min and 100 μM/min, resp.). After PH treatment, the ability of the liver to selectively eliminate the dye from the blood is probably increased. The results show that in newborns with nonhemolytic hyperbilirubinemia, the characteristic parameters of saturation kinetics are changed after PH treatment. The kinetics of ICG elimination support the hypothesis that cytoplasmatic proteins of liver should facilitate the uptake of organic anions, including bilirubin, into the liver cell. A deficiency of these transport protein may be one of the causes of the development of nonhemolytic hyperbilirubinemia in newborns.

5062 AGAR INGESTION COMBINED WITH PHOTOTHERAPY IN JAUNDICED NEWBORN INFANTS. (Eng.) Ebbesen, F.; Moller, J. (Rigshospitalet, Tagensvej 18, 2200 Copenhagen N, Denmark). *Biol. Neonate* 31(1/2): 7-9; 1977.

Studies were carried out in 49 jaundiced neonates to determine whether agar ingestion enhances the effect of phototherapy in reducing the serum bilirubin levels. Nonimmunized infants with a birth weight of more than 2,000 g were given phototherapy with white light for more than 36 hr. The average period of treatment was 61 hr. Twenty-four infants received 250 mg agar at the beginning of each meal at 3-hr intervals during phototherapy, and the remaining 25 infants received phototherapy alone. Serum bilirubin levels were decreased similarly in both groups. It is concluded that ingestion of agar does not supplement the effect of phototherapy.

5063 RENAL CLEARANCE OF GLUCURONATE-CONJUGATED BILIRUBIN FRACTIONS IN VARIOUS FORMS OF JAUNDICE. I. INTRODUCTION. NORMAL SUBJECTS. (Spa.) Candel Monserrate, I.; Diaz-Rubio Garcia, M. (Hospital Clinico San Carlos, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(1):1-12; 1975.

In a series of studies, monoglucuronated and diglucuronated (monoconjugated and diconjugated) bilirubin fractions were examined in the blood and urine of 14 healthy subjects and 47 patients with various types of jaundice. The following parameters were determined: direct- and indirect-reacting bilirubin in blood and urine; monoconjugated and diconjugated bilirubin fractions in blood and urine; pH, density, albumin content, and volume of urine; creatinine clearance; renal clearance of bilirubin; bromine; blood pH; and serum albumin, gammaglobulins, phosphatases. All 14 healthy subjects (ages 22-71; 8 men and 6 women) had a much higher percentage of monoconjugated bilirubin in the blood (average= 91.50 mg%) than in urine (average=37.28 mg%). Renal clearance of diconjugated bilirubin (average=9.559 cm^3/min) was considerably higher than clearance of the monoconjugated form (0.431 cm^3/min). Direct-reacting bilirubin was higher (average=0.28 mg%)

in the urine than was indirect-reacting (0.17 mg%). There were slight correlations between the amount of diconjugated bilirubin in the blood and renal clearance or pH. With exceptions, no correlations were seen between the conjugated fractions and the other parameters measured. The lack of correlation between creatinine clearance and bilirubin clearance suggests that, once filtered by the glomeruli, the bilirubin may be reabsorbed by the tubule.

5064 RENAL CLEARANCE OF GLUCURONATE-CONJUGATED BILIRUBIN FRACTIONS IN VARIOUS FORMS OF JAUNDICE. II. HEMOLYTIC JAUNDICE.

(Spa.) Candel Monserrate, I.; Diaz-Rubio Garcia, M. (Hospital Clinico San Carlos, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(2):131-144; 1975.

The results for six patients with hemolytic jaundice are reported from an extended study of renal clearance of glucuronate-conjugated bilirubin fractions. The following parameters were measured (52 determinations/patient): direct- and indirect-reacting bilirubin in blood and urine; pH, density, albumin content, and volume of urine; creatinine clearance; renal clearance of bilirubin; blood pH; and serum albumin, gammaglobulin, prothrombin, bromine, SGOT, SGPT, and alkaline and acid phosphatases. Correlation coefficients (r) were calculated for clearance of bilirubin fractions and the other parameters. The apparent predominance of diconjugated fraction clearance over clearance of the monoconjugated fraction decreased significantly ($p<0.05$) with respect to normal values. A direct correlation was shown between blood and urine levels of direct-reacting bilirubin and indirect-reacting bilirubin ($r=0.953$ and 0.940, resp.). A direct correlation was shown between urine direct- and indirect-reacting bilirubin and blood alkalinity ($r=0.849$ and $r=0.808$, resp.). A clear inverse correlation was found between clearance of diconjugated bilirubin and the level of plasma albumin ($r=-0.950$). No other correlations were demonstrated. In general, the patient with hemolytic jaundice show a better correlation than normal subjects between bilirubinemia and bilirubinuria.

5065 THE APPLICATION OF THE "LOJDA" METHOD FOR INTESTINAL LACTASE IN INTESTINAL BIOPSIES FROM JAUNDICED NEWBORN INFANTS.

(Eng.) Bakken, A. F. (Rikshospitalet, Univ. Oslo, Oslo, Norway). *Histochemistry* 51(2/3):253-255; 1977.

See also, 4775, 5089.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

5066 FULMINANT HEPATITIS AND DEVELOPMENT OF ARTIFICIAL LIVER SUPPORT.

(Eng.) Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, S.E. 5, England). *Rush Presbyt. St. Luke's Med. Bull.* 15(2):132-143; 1976.

Two hundred cases of fulminant hepatitis were studied. Brain damage (cerebral edema), endotoxemic pulmonary infections, hemorrhagic diathesis, and localized erosions on the esophagus and stomach are reported to be common causes of death of these patients. The development of a biocompatible and efficient adsorbent perfusion system for protein-bound substances was investigated. Thirty-one patients were treated with charcoal (coated with acrylic hydrogel) hemoperfusion; 39% survived. Selective adherence of large platelets to coated charcoal is reported to result in prolonged bleeding and death. Use of cimetide or metiamide (sufficient to maintain an intragastric pH greater than 5) stopped bleeding in all of the fourteen patients studied ($p=0.001$). Use of immobilized carbon particles on a support polyester film combined with the Rhone-Poulenc dialysis machine is reported to be a satisfactory perfusion system and is under investigation. The possible use of albumin-coated XAD-7 is suggested because the resin has a high binding capacity for protein-bound metabolites so that both the supporting material and the coating should contribute to binding capacity.

5067 CURRENT STATUS OF POST-TRANSFUSION HEPATITIS.

(Eng.) Conrad, M. E. (Div. Hematology and Oncology, Univ. Alabama, Birmingham, AL 35294). *Am. J. Hematol.* 1(3):357-365; 1976.

The history of post-transfusion hepatitis is reviewe to describe the extent of the hepatitis problem associated with blood component therapy. Hepatitis A and hepatitis B are transmitted by both oral and parenteral routes. The discovery of hepatitis B surface antigen (HBsAg) provided an immunologic method for the identification of both patients and

rriers with hepatitis B. HBsAg is related to
agments of a lipoprotein membrane coating the sur-
ce of the complete virion particle. Three types
particles are reported in serum of the HBsAg-
sitive patient; small 20 mμ spheres, tubules 20
in diameter and up to 100 mμ long, and the more
mplex 42 mμ Dane particles that may be the com-
ete virion. The inner core of the Dane particles
ntains hepatitis B core antigen (HBcAg). Studies
serum for core antibody (anti-HBc) and HBsAg
e helpful in detection of hepatitis B. About 0.2%
the United States population are carriers of
sAg and probably are infectious. The prevalence
both HBsAg and anti-HBs is several fold greater
ong commercial blood donor populations than among
lunteer donors, among first time donors than re-
at donors, among men than women, among noncauca-
ans than caucasians, and among city dwellers than
rmers. The hepatitis associated antigen (HAA)
s presumed to the infectious agent for hepatitis A.
out 80% of post-transfusion hepatitis is caused by
e or more unidentified agents (non-A non-B
patitis). Good blood bank practices such as
e use only of carefully screened volunteer
nors, minimizing the number of donor units
ansfused, use of frozen washed RBC transfusions,
d prophylactic use of immune human serum gamma
obulin are suggested that might decrease both
e severity and occurrence of post-transfusion
patitis in blood recipients.

68 HEPATITIS DUE TO ASPIRIN. REPORT OF FOUR CASES.

(Spa.) Badrinas, F.; Niubo, R.;
lardell, J.; Nogues, F. (Ciudad Sanitaria "Prin-
pes de Espana," Hospitalet de Llobregat, Barcel-
a, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):
6-817; 1976.

xic hepatitis due to high doses of acetosalicylic
id (3-4 g/day) is reported in four patients under
eatment for various disorders: a 29-yr-old patient
d acute idiopathic pericarditis (AP), a 32-yr-old
tient had systemic lupus erythematosus (SLE), and
patients (10 and 15 yr old) had rheumatic fever.
spirin was given for 9, 12, 6, and 30 days, resp.;
spepsia and elevated enzyme levels (glutamic oxa-
te transaminase, glutamic pyruvate transaminase, and
ctate dehydrogenase) were noted in all patients.
ne showed jaundice, and only the patient with
E had hepatomegaly. Four to 17 days after sus-
nding aspirin treatment, all symptoms of hepa-
toxicity disappeared. When aspirin was reintro-
ced at the same dose in the AP and SLE patients,
xic symptoms returned after 5 and 14 days, resp.
cause patients with these disorders are often
eated chronically with large doses of acetosal-
ylic acid, it is important to recognize the pos-
ble hepatotoxic effects.

069 DANTROLENE-ASSOCIATED HEPATIC INJURY. INCIDENCE AND CHARACTER.

(Eng.) Utili, R.;
itnott, J. K.; Zimmerman, H. J. (Veterans Admin.
sp., 50 Irving St., N.W., Washington, DC 20422).
astroenterology 72(4):610-616; 1977.

The incidence and character of dantrolene-induced liver injury is described. Hepatic injury during long-term dantrolene sodium therapy occurred in 19 of 1,044 patients monitored for at least 60 days. Six had icteric hepatitis (0.6%) and three died. After the marketing of the drug, an additional 31 cases of dantrolene-associated liver disease were available for analysis. Of these, 16 had icteric hepatitis with a favorable outcome, and 11 died. The injury was mainly hepatocellular with a pattern of acute or subacute hepatic disease or chronic active hepatitis. Analysis of 50 cases showed a 28% fatality rate. All the fatalities occurred in patients over 30 yr of age and after at least 2 months of therapy, with 57% of the cases exposed for at least 6 months. Eleven of the 14 fatalities occurred in females ($p<0.05$). No cases of hepatic disease occurred in patients exposed for less than 1 month or under the age of 10 yr. The majority of adverse reactions (71%) occurred between 1 and 6 months of therapy. Daily dosage of 300 mg or more was associated with higher incidence of hepatotoxic reactions and with the majority (85%) of the fatalities. This idiosyncratic hepatic injury does not appear to involve hypersensitivity to the drug. A careful assessment of the benefit-risk ratio in the therapeutic use of dantrolene sodium is proposed.

5070 CLINICAL ASPECTS OF HALOTHANE HEPATITIS.

(Ger.) Polterauer, P.; Brunner, H.; Grabner, G. (Ordinariat fur Gastroenterologie, Garnisongasse 13, A-1090 Vienna, Austria). *Wien. Med. Wochenschr.* 127(3):110-113; 1977.

Halothane hepatitis developed in a 53-yr-old woman after the agent was used as an anesthetic during extirpation of a breast node. She had previously developed a short-term fever when halothane was used during treatment of a fracture, but this was considered an exacerbation of chronic pyelitis in known nephrolithiasis. Six hours after the second procedure, the patient had a fever of 39.5 C associated with nausea and vomiting. Numerous bacteria, RBC, and WBC were found in the urinary sediment; these symptoms were thought to represent a urinary tract infection, for which trimethoprim-sulfamethoxazole was given. The fever persisted along with fatigue and epigastric pain. On the eighth postoperative day, pathological liver function parameters were found (bilirubin 0.8 mg%, SGOT 190 mU/ml, SGPT 270 mU/ml, alkaline phosphatase 166 mU/ml). The patient also had moderate eosinophilia with numerous WBC and *Proteus* in the urinary sediment. A liver scan showed a markedly enlarged liver with diffuse, inhomogeneous storage distribution. While the fever abated on day 10, transaminase levels peaked, and then remained constant between 120 and 170 mU/ml after a temporary fall. A liver biopsy revealed signs of toxic hepatitis, liver cell necroses, inflammatory infiltrates, and Kupffer cell activation in the lobules and multinuclear giant cells. Corticoid therapy with methylprednisolone (24 mg/day) was started on the 28th postoperative day. The transaminase and cholestasis enzyme levels returned to normal, and the patient was discharged on the 42nd postoperative day.

5071 MEGLUMINE IODIPAMIDE (CHOLOGRAFIN) HEPATOTOXICITY.

(Eng.) Sutherland, L. R.; Edwards, L. A.; Medline, A.; Wilkinson, R. W.; Connon, J. J. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada). *Ann. Intern. Med.* 86(4):437-439; 1977.

Two cases of meglumine iodipamide hepatotoxicity, confirmed by liver biopsy, are reported. The first patient, a 42-yr-old woman, underwent four i.v. cholangiograms for the investigation of nausea that occurred 1 yr following cholecystectomy. Forty milliliters of meglumine iodipamide were given over a 30-min period. She experienced nausea after the first cholangiogram and later had vomiting, dark urine, pale stools, and jaundice. After the last i.v. cholangiogram was carried out, she became febrile, and the liver was tender. Polymorphonuclear leukocytosis, elevated bilirubin, and elevated aspartate transaminase levels were present. A liver biopsy, carried out 4 days after the last cholangiogram, revealed marked centrilobular necrosis and abundant lipofuscin pigment in both altered hepatocytes and histiocytes in the involved areas. The second patient, a 43-yr-old man, who had recovered from viral hepatitis 5 yr earlier, underwent p.o. cholecystography for the evaluation of right upper quadrant pain. Two i.v. cholangiograms and a second p.o. cholecystogram were subsequently carried out. His symptoms were similar to those of the first patient, as were the liver biopsy findings; however, lipofuscin pigment was absent. A repeat liver biopsy 1 month later showed normal histology. Liver function tests are warranted in patients who experience nausea, vomiting, or fever after i.v. cholangiography.

5072 EARLY UNCONJUGATED HYPERBILIRUBINAEMIA AFTER PARACETAMOL OVERDOSAGE.

(Eng.) Davidson, A. R.; Rojas-Bueno, A.; Thompson, R. P. H.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Scand. J. Gastroenterol.* 11:623-628; 1976.

A rapid increase in predominantly unconjugated bilirubin in the blood that was not due to hemolysis was observed in 38/60 patients who had ingested an overdose of paracetamol (10-125 g). Moderate liver damage (maximum bilirubin, 17-68 μM/1) was seen in 27 patients and severe liver damage (maximum bilirubin, >68 μM/1 in 11 patients. In all 38 patients, the plasma bilirubin levels rose during the first 3 days; in 5 patients who died, the peak bilirubin level was reached on the day of death (3-8 days after overdose). More than half of the mean
total bilirubin level was at all times indirect-
reacting and therefore predominantly unconjugated
Severe hemolysis was excluded by findings of norm
reticulocyte counts and the absence of a fall in
hemoglobin level. In experimental studies, male
albino Sprague-Dawley rats received either a norm
diet (controls), phenobarbitone (1 g/l drinking
water) for 4 days before sacrifice, or the same
phenobarbitone dose for 4 days followed by para-
cetamol treatment (3.5 g/kg by gastric lavage) 24
hr before sacrifice. The specific content of mic
somal cytochrome P.450 was increased by 71% after
phenobarbitone pretreatment (from 805 ± 374 to 1,
± 486 μmol/mg microsomal protein, $p < 0.125$), where
there was a 57% reduction of P.450 in phenobarbit
paracetamol-treated rats (to 586 ± 190 μmol/mg, p
0.001). Changes in total liver P.450 content wer
greater, being 428, 787, and 252 mmol/liver for c
trols, phenobarbitone-treated, and phenobarbitone
paracetamol-treated rats, resp. Phenobarbitone i
creased the mean specific activity of bilirubin g
curonyl transferase from 1.2 ± 0.34 to 2.2 ± 0.90
μmol bilirubin conjugated/g liver/hr ($p < 0.01$); wh
after phenobarbitone/paracetamol treatment, the m
specific activity of the transferase was 1.3 ± 0.
μmol/g/hr ($p < 0.01$). Changes in total bilirubin g
ronyl transferase activity in the liver were grea
being 9.8 ± 3.1, 56.7 ± 14.2, and 11.6 ± 8.4 μmol
conjugated bilirubin/liver/hr for controls, pheno
barbitone-treated, and phenobarbitone/paracetamol
treated rats, resp. ($p < 0.001$). Both P.450 and
glucuronyl transferase are enzymes of the endopla
mic reticulum, and it is suggested that early dam
age of the hepatic endoplasmic reticulum contribu
to the hyperbilirubinemia of paracetamol poisonin

5073 INFLUENCE OF POISONING ON LIVER AND INT
TINES.

(Ger.) Holle, G. (Pathologisch
Institut, Karl-Marx-Universitat, Liebigstr. 26, D
701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stof
wechselkr.* 36(2):49-58; 1976.

See also, 4735, 5027, 5038.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

5074 SIGNIFICANCE OF ISOENZYME STUDIES IN THE DIAGNOSIS OF LIVER DISEASES. PART 1: THEORETICAL CONCEPTS.

Graubaum, H. J.; Wagenknecht, C.; Schneider, G.; Schimmelpfennig, W.; Klimmt, G.; Baumgarten, R. (Institut fur Physiologische und Biologische Chemie, Bereich Medizin, Humboldt-Universitat, Hessische Strasse 3/4, DDR-104 Berlin, E. Germany). *Dtsch. Gesundheitsw.* 32(22):1015-1019; 1977.

The significance of isoenzyme studies in the diag
nosis of viral hepatitis and other liver disease

s discussed on the basis of correlations between ell structure and metabolism. Isoenzymes are artly organ- and organelle-specific. The isoenzyme attern is of diagnostic relevance because it is he result of regulatory mechanisms of enzyme synhesis and degradation and because the isoenzymes have reatly different serum elimination rates. The isonzymes of aldolase, LDH, and glutamic-oxalacetic ransaminase (GOT) were selected for their diagostic value. Cytoplasmic LDH isoenzymes show a cerain organ-specificity; synthesis of the H and M ypes depends on the oxygen supply. A direct relaionship was established between the H/M ratio and he rate of glycolysis. Aldolase isoenzymes are ighly organ-specific and changes in their pattern ere observed in the fetal liver and in hepatomas. he serum aldolase level is assumed to be a funcion of the rates of glycolysis and glyconeogenesis. he organelle-specific GOT isoenzymes may be able o differentiate between metabolic changes in the ytoplasm and in the mitochondria, which is imporant for evaluation of the extent of cell damage.

075 THE OCCURRENCE OF ORCEIN-POSITIVE HEPATOCELLULAR MATERIAL IN VARIOUS LIVER DISEASES.

Eng.) Salaspuro, M. P.; Sipponen, P.; Makkonen, H. Second Dept. Medicine, Univ. Helsinki, 00290 Helinki 29, Finland). *Scand. J. Gastroenterol.* 11(7): 77-681; 1976.

he occurrence of orcein-positive material was xamined in liver specimens from 103 patients with arious hepatic diseases and from 297 consecutive iver biopsies examined routinely. The specimens ere stained with orcein after oxidation with poassium permanganate. The 103 patients included 0 with Dubin-Johnson's syndrome, 5 with Gilbert's isease, 3 with hemochromatosis, 13 with acute heptitis, 14 with chronic persistent hepatitis, 12 ith alcoholic hepatitis, 9 with toxic hepatitis, 7 with cirrhosis, 4 with congenital biliary tresia, and 16 with extrahepatic biliary obstrucion. Orcein-positive material was demonstrated n two patients with long-standing biliary obstrucion without biliary cirrhosis and in three patients ith alcoholic liver disease characterized by intraepatic cholestasis of several months' duration. rcein positivity occurred in 22 of the 297 liver iopsy specimens in the second group of patients. istological cholestasis occurred in two cases of lcerative colitis with associated cholestatic liver isease, one case of cirrhosis combined with chronic ctive hepatitis, one case of biliary cirrhosis, nd three cases of alcoholic cirrhosis combined ith hepatoma. Other orcein-positive cases included rimary biliary cirrhosis, ulcerative colitis plus hronic active hepatitis, hepatogestosis, and lcoholic cirrhosis. Orcein-staining is useful in he differential diagnosis of primary biliary cirhosis; the only orcein-negative patient with priary biliary cirrhosis in this series had a very ild disease with low serum levels of alkaline hosphatase and minimal histological changes.

076 SIGNIFICANCE OF ISOENZYME STUDIES IN THE DIAGNOSIS OF LIVER DISEASES. PART 4: ACUTE HEPATITIS--POSSIBILITIES OF AN EVALUATION OF CURE ON THE BASIS OF LOAD TESTS.

(Ger.) Papsdorf, S.; Binus, R.; Hannig, B.; Wollmann, A.; Winkler, G. U.; *et al.* (Institut fur Physiologie und Biologische Chemie, Bereich Medizin, Humboldt-Universitat, Hessische Strasse 3/4, DDR-104 Berlin, E. Germany). *Dtsch. Gesundheitsw.* 32(26):1207-1211; 1977.

Aldolase (ALD), glutamic oxalacetic transaminase (GOT), and LDH activities of the venous blood were determined in 85 adults and 34 children during convalescence from acute hepatitis to assess the degree of recovery. Blood samples were taken before, immediately, and 24 hr after bicycle ergometer load test; the test was stopped as soon as a critical heart rate (160/min in adults, 210/min in children) was exceeded. The tests were performed 4-10 weeks after the manifestation of prodromal symptoms in adults and during the third to fifth weeks in children. It was possible to classify all patients as normal (normal isoenzyme activity before and after the load test), suspect (normal isoenzyme activity before and abnormal activity after the load test), or pathological (isoenzyme activity before and after the load test). Among the adults, the suspect group included 56% of all patients with protracted hepatitis; the other 44% were classed as pathological. In adults and in children, the altered isoenzyme activities were mainly cytoplasmic GOT and hepatic ALD and, sometimes, M-type LDH; mitochondrial GOT, type-H LDH, and muscular ALD were rarely affected.

5077 VERTICAL TRANSMISSION OF HEPATITIS-B SURFACE ANTIGEN.

(Eng.) Boxall, E. H. (East Birmingham Hosp., Birmingham B9 5ST, England). *Biomedicine* 26(1):12-15; 1977.

The transmission of hepatitis B virus from mother to infant, causing severe neonatal hepatitis, is reviewed. There is a large difference in the rate of vertical transmission in acute hepatitis and in the chronic carrier state. Transmission from a mother with acute hepatitis during pregnancy carries a greater risk for the infant in terms of acute hepatitis early in life or serious chronic liver disease with hepatitis B surface antigenemia. This risk is higher the closer the infection is to the time of delivery. Transmission from carrier mother falls into two distinct geographic groups. In the Eastern world, where the carrier rate is high, almost half the children born to carrier mothers also become carriers. In the Western world, only about 5% of children born to carriers also become carriers within the 1st yr of life. The reason for these differences may lie in different population distributions of e antigen, which has recently been shown to be associated with the transmission of the carrier state.

5078 HEPATITIS EPIDEMIOLOGY IN ZURICH CANTON AND VICINITY IN 1976.

(Ger.) Regli, P. J.; Joller-Jemelka, H. I.; Grob, P. J. (Abteilung fur Klinische Immunologie, Universitat Zurich, Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(22):769-779; 1977.

A total of 338 cases of acute viral hepatitis were diagnosed in Zurich Canton and vicinity in 1976. Hepatitis B (HB) was diagnosed in 188 cases, non-B hepatitis (NBH) in 150. The number of NBH cases decreased with age. Twenty-six patients had a history of hepatitis. There were no significant differences between men and women in the incidence of HB and in age at onset; the seasonal spread of the cases was also fairly uniform. Medical diagnostic and therapeutic procedures were thought to be responsible for viral transmission in 43% of the patients (73% of whom had HB). Travel to southern countries (Iraq, India, Africa) was the cause of hepatitis in 3 clusters of 16 cases, the only clusters observed in 1976. Sexual and social contact was the source of the disease in 56 patients, 33 of whom had HB. The estimated risk of hepatitis was highest for drug addicts (1.5%/yr), followed by medical personnel (0.3%-0.5%/yr), and travelers to high-risk countries (0.4%/yr).

5079 HEPATITIS B OUTBREAK TRACED TO AN ORAL SURGEON. (Eng.) Rimland, D.; Parkin, W. E.; Grayson, P. H.; Miller, B., Jr.; Schrack, W. D. (Emory Univ. Sch. Medicine, 69 Butler St., S.E., Atlanta, GA 30303). *N. Engl. J. Med.* 296(17):953-958; 1977.

A large outbreak of hepatitis B that was traced to a single hepatitis B surface antigen (HBsAg) carrier was investigated. Over a 4-yr period in a five-county area, 71 patients with clinical hepatitis B had dental work performed in the 2-6 months before their illness. Fifty-five cases were traced to a single oral surgeon. Seventy-nine percent of these patients were positive HBsAg, and most had no other recognized source of hepatitis. An investigation of the implicated dentist uncovered no gross inadequacies in instrument sterilization or general dental procedures; however, the dentist was found to be an asymptomatic carrier of HBsAg of the same subtype (*ay*) as 9/11 of his patients who had hepatitis and whose sera were tested. Since no HBsAg was found in the dentist's saliva, urine or feces, and since he admitted to having frequent cuts on his fingers, it is possible that a "hemo-oral" transmission of HBsAg produced hepatitis in his patients.

5080 SCREENING HOSPITAL PATIENTS FOR HEPATITIS B SURFACE ANTIGEN. (Eng.) Linnemann, C. C., Jr.; Hegg, M. E.; Ramundo, N.; Schiff, G. M. (231 Bethesda Ave., Cincinnati, OH 45267). *Am. J. Clin. Pathol.* 67(3):257-259; 1977.

The prevalence of hepatitis B surface antigen (HBsAg) and antibody to HBsAg (HBsAb) was determined in 1,026 patients to determine whether routine screening for this antigen and antibody is indicated. Fifteen patients (1.5%) were HBsAg-positive. The prevalence of HBsAg ranged from 4.8% (1/21) in the dialysis unit to 0% on the psychiatry service. Only 2 of the 15 patients had a diagnosis of hepatitis and, if these were excluded, the percentage of HBsAg-positive patients decreased to 1.3%. Of 971 patients tested, 211 (21.7%) had HBsAb. The percentages with antibody ranged from 13.4% on the obstetrics and gynecology
service to 29.8% on the medical service. Nineteen
percent of the dialysis patients had HBsAb. Routi
screening of all hospital admissions to detect the
1.3% with HBsAg does not seem justified by the ris
In addition, recognition of hepatitis B antigenemi
would not significantly alter the patient's care.
Routine measurement of SGOT on admission would be
less expensive and more effective in identifying
anicteric or chronic hepatitis.

5081 OCCURRENCE OF SUBTYPES OF HEPATITIS B
ANTIGEN IN ACUTE HEPATITIS AND CHRONIC
LIVER DISEASES. (Ger.) Buki, B.; Szalay, F.;
Nagylucskay, S.; Schvaab, E.; Magyar, D. (I. Medi-
zinische Klinik, Semmelweis-Universitat, Koranyi
u. 2/a, 1083 Budapest, Hungary). *Dtsch. Gesund-
heitsw.* 32(26):1215-1218; 1977.

Hepatitis B surface antigen (HBsAg)-positive sera
from 510 patients with acute viral hepatitis B an
sera from 113 patients with chronic liver disease
were analyzed electrophoretically for HBsAg sub-
types. In acute hepatitis, *ad* and *ay* subtypes we
found in 229 and 281 cases, resp.; among 353 ic-
teric cases, the *ad* subtype was found in 138, *ay*
215; among the 157 anicteric cases, *ad* and *ay* wer
found in 91 and 66 cases, resp. In the age group
0-10 yr, *ad* and *ay* were found in 41 and 46 cases,
resp., versus 61 and 64 in the group aged 11-20 y
and 86 in the group aged 21-40 yr, 44 and 56 in t
group aged 41-60 yr, and 23 and 29 in those >60 y
Twenty patients remained positive after the acute
phase; six had *ad*, and 14, *ay*. Thirty-one of the
113 patients with chronic liver diseases were HBs
positive. Seven had *ad* (1/29 in chronic persisti
hepatitis, 0/6 in chronic aggressive hepatitis, 4
in cryptogenic cirrhosis, 1/13 in alcoholic fatty
degeneration, 1/20 in alcoholic cirrhosis, and 0/
in other liver diseases). Twenty-four patients h
subtype *ay* (6/29 in chronic persisting hepatitis,
2/6 in chronic aggressive hepatitis, 10/26 in
cryptogenic cirrhosis, 1/13 in alcoholic fatty de
generation, 2/20 in alcoholic cirrhosis, and 3/19
in other liver diseases). No correlation was fou
between subtype and the seriousness of the clinic
chemical, immunological, and histological changes
chronic liver diseases.

5082 HEPATITIS B SURFACE ANTIGEN (HBsAg) IN
HOSPITALIZED CHILDREN. (Ger.) Meier,
Ch.; Frey-Wettstein, M. (Blutspendezentrum Limmat
CH-8952 Schlieren/Zurich, Switzerland). *Helv.
Paediatr. Acta* 32(1):11-19; 1977.

Serum samples from 1,940 children hospitalized fo
various conditions were analyzed for hepatitis B
surface antigen (HBsAg). Sera from 26 patients w
found to be HBsAg-positive by hemagglutination an
radioimmunoassay; the positive patients included
3 with hepatitis B. Thus, the incidence of
positive cases that were hepatitis B-independent
was 1.19%. This incidence was 1.7% among childre
at a large university children's hospital and 0.6
among those at small regional hospitals. The age
brackets 0-4, 5-8, and 9-12 yr had six positive

children each, and five were in the age bracket 13-16 yr; the corresponding percentages were 1.03%, 1.25%, 1.60%, and 1.68%, showing a slowly rising tendency with age. Thirteen of the positive children were hospitalized for blood transfusion, 10 for malformations, 5 for cardiac catheterization, 3 each for renal diseases and immune deficiency, 6 for neurological disorders, 9 for perinatal disturbances, and 8 for other reasons. Vertical transmission of hepatitis B virus from pregnant or nursing mothers to their children could not be found. Infection in early childhood appears probable at least in some of the cases.

5083 SUBTYPING OF HEPATITIS B SURFACE ANTIGEN AND ANTIBODY BY RADIOIMMUNOASSAY. (Eng.)

Hoofnagle, J. H.; Gerety, R. J.; Smallwood, L. A.; Barker, L. F. (Bureau Biologics, Food and Drug Admin., Bethesda, MD). *Gastroenterology* 72(2): 290-296; 1977.

A commercially available solid-phase radioimmunoassay (RIA) for antibody to hepatitis B surface antigen (HBsAg) was modified to detect the subtypes of HBsAg (*adw, ayw, adr,* and *ayr*) as well as the subtype-specific anti-HBsAg reactivities (anti-*d*, anti-*y*, and anti-*w*). Because the RIA test is available and standardized, the need for preparing and radiolabeling reagents every 45-60 days is circumvented. The necessary antisera and HBsAg subtypes can be used without purification. High dilutions of the monospecific reagents are used so that only small quantities of the original antisera are needed (each 0.1 ml of antiserum provided 250-8,000 tests). In endpoint dilution studies, RIA subtyping was 10-50 times as sensitive as rheophoresis or counterelectrophoresis (CEP). In tests of sera from chronic HBsAg carriers, 12% of the samples could not be subtyped by CEP or rheophoresis, whereas RIA was capable of detecting the subtype in all samples. Where all three methods were positive, RIA gave results identical to those of rheophoresis and CEP. In studies of type B hepatitis in man and chimpanzees from which weekly bleedings were available, RIA subtyping of HBsAg increased the ability to detect subtypes by 25-30%. Persons exposed to an infectious plasma pool containing HBsAg with both *adw* and *ayw* subtype reactivities were frequently found to circulate HBsAg with both *d* and *y* subdeterminants. Using RIA, 54% (37/68) of these patients demonstrated both *d* and *y* reactivities. The occurrence of both subtypes together (chiefly in patients exposed to both subtypes and rarely in chronic carriers) suggests that the apparent simultaneous *d* and *y* infections were not attributable to false specificity of the reagents. Whether these samples with both *d* and *y* subdeterminants of HBsAg represent the circulation of two populations of HBsAg particles, one *adw* and one *ayw*, as opposed to the circulation of hybrid *adyw* particles, cannot be ascertained by this method, Not all anti-HBsAg-positive samples can be subtyped, even by RIA. Some samples appear to possess anti-*a* but no anti-*d* or anti-*y*. Anti-*w* is found only rarely. Among the anti-HBsAg-positive samples studied, about 75% of the specimens could be subtyped for anti-*d* or anti-*y*, and most samples possessed anti-*a* in excess of either anti-*d* or anti-*y*. Further studies are needed to characterize the onset, persistence, and general incidence of the subdeterminant specificities of anti-HBsAg in relation to anti-*a*.

5084 LIVER DISEASE AND THE IMMUNE RESPONSE TO AUSTRALIA ANTIGEN. (Spa.)

Lissen Otero, E.; Caraballo Guijarro, R.; Crivell Charneco, C.; Andreu Kern, F. (Ciudad Sanitaria "Virgen del Rocio," Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(2):213-226; 1976.

Clinical and laboratory observations of healthy carriers of viral hepatitis of patients with acute hepatitis and of patients with chronic hepatopathies are reviewed with respect to their immune responses to hepatitis B viral antigen (HBAg). The carriers usually showed the highest blood and liver tissue levels of HBAg; they usually had normal B and T lymphocyte levels, a substantial predominance of histocompatibility antigens HL-A3 and W19, and a lowered immune response to HBAg. In patients with acute hepatitis B, reduced levels of B and T lymphocytes were accompanied by lymphocytotoxic antibodies and antibodies against HBAg. Nonspecific cellular immunity was lower during the acute episode and returned to normal during convalescence. Sensitization of specific cell immunity was noted in some acute hepatitis patients (indicated by migration inhibiting factor response to HBAg). In chronic aggressive hepatopathy patients, the following tendencies were noted: (1) predominance of histocompatibility antigens HL-A1 and HL-A8, (2) reduced levels of T lymphocytes and increased levels of lymphocytes, (3) reduced nonspecific cell immunity, and (4) specific cell sensitization. One theory suggests that the healthy carriers do not respond immunologically to infection either because of a failure to recognize HBAg as foreign or because of an inability to respond after recognition. The development of an immune response to the viral antigen would precipitate an acute hepatitis episode. Another theory proposes that once the invading virus has triggered first T and then B lymphocytes, aggressive immune hepatocytolysis, a patient can follow one of two courses: (1) circulating antibodies can effectively clear the system of HBAg, in which case T lymphocytes stop being stimulated and the immune process winds down as in acute hepatitis, or (2) circulating antibodies fail to eliminate HBAg, the infection continues to spread, and the process is perpetuated, as in case of chronic aggressive hepatitis. This latter hypothesis best explains the pathogenic mechanism of self-perpetuating chronic hepatitis in patients who are HBAg negative; however, none of the proposed theories provides a completely satisfactory explanation.

5085 EXTRINSIC MODULATION OF HUMAN T-LYMPHOCYTE E ROSETTE FUNCTION ASSOCIATED WITH PROLONGED HEPATOCELLULAR INJURY AFTER VIRAL HEPATITIS. (Eng.)

Chisari, F. V.; Routenberg, J. A.; Fiala, M.; Edgington, T. S. (Scripps Clinic and Res. Foundation). *J. Clin. Invest.* 59(1):134-142; 1977.

The association between the extrinsic defect of T lymphocyte E rosette (ER) function (due to the presence of rosette inhibitory factor in autologous serum) and chronic virus-initiated hepatocellular injury following viral hepatitis was examined. The extrinsic defect was observed in 7/8 patients with longstanding chronic active hepatitis and in all of 10 patients with unresolved hepatitis 12 weeks after the onset of jaundice. In contrast, none of nine patients with resolved hepatitis had extrinsically defective ER function 12 weeks after the onset of jaundice, whereas eight of them displayed an intrinsic defect of ER function at that time. Among the various viral and liver diseases studied, rosette inhibitory factor appeared to be specific for hepatitis A and B viral infections. None of 64 sera from a variety of viral and mycoplasma infections (including Epstein-Barr virus or cytomegalovirus mononucleosis with associated hepatitis) or 15 sera from patients with chronic nonviral liver diseases (Laennec's cirrhosis, hemochromatosis, primary biliary cirrhosis, extrahepatic bile duct obstruction, metastatic liver disease, idiopathic cirrhosis) were positive for rosette inhibitory factor. This factor and its associated extrinsic defect in ER function appear to correlate with a particular type of hepatocellular injury initiated by the hepatitis A and B viruses that may have a propensity for persistence and/or progression to an aggressive form of chronic hepatitis.

5086 A RANDOMIZED, DOUBLE BLIND CONTROLLED TRIAL OF THE EFFICACY OF IMMUNE SERUM GLOBULIN FOR THE PREVENTION OF POST-TRANSFUSION HEPATITIS: A VETERANS ADMINISTRATION COOPERATIVE STUDY.

(Eng.) Seeff, L. B.; Zimmerman, H. J.; Wright, E. C.; Finkelstein, J. D.; Garcia-Pont, P.; Greenlee, H. B.; *et al.* (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Gastroenterology* 72(1):111-121; 1977.

A study was conducted in 11 Veterans Administration hospitals (2,204 patients) during a 49-month period to compare the relative efficacies of immune serum globulin (ISG; 1,094 patients) and an albumin placebo (1,110 patients) for the prevention of post-transfusion hepatitis (PTH). PTH developed in 241 (10.9%) of the patients. The results showed that ISG significantly reduced (p=0.045) the incidence of icteric-type non-B hepatitis only (inferred also to be type non-A hepatitis). Adverse reactions were rare, and the ISG did not appreciably alter the incubation period or duration of the disease. ISG did not have an effect on total incidence of PTH among recipients of commercial donor blood (p<0.015). Type-B hepatitis occurred in less than 20% of the 241 patients studied. The incidence of PTH was higher among white patients (12.0%, p<0.01) than among black patients (7.9%). Type-B hepatitis and infection occurred significantly more often (p<0.005 and p<0.001, resp.) in the hepatitis B surface antibody (anti-HBs)-negative group. The incidence of
total hepatitis was six times greater (p<0.001) i
the recipients of commercial blood (15.5%) than i
recipients of volunteer donor blood (2.6%).
The incidence of total hepatitis rose almost line
ly with the number of units of commercial blood a
ministered, reaching a peak of 40.6% among those
who had received 11 or more units of this form of
blood. Recipients of positive hepatitis-B surfac
antigen (HBsAg-positive) donor blood had a greate
incidence of PTH (p<0.001) than did recipients of
HBsAg-negative blood (27.1% compared to 10.5%).
Elimination of the use of commercial blood and
HBsAg-positive blood was suggested. The importan
of defining the agents responsible for type non-A
non-B hepatitis is stressed.

5087 SILYMARIN FOR THE TREATMENT OF ACUTE VI HEPATITIS? REPORT OF A CONTROLLED TRIA

(Ger.) Bode, J. Ch.; Schmidt, U.; Durr, H. K.
(Medizinische Klinik der Universitat, Mannkopff-
strasse 1, D-3550 Marburg/Lahn, W. Germany). *Med*
Klin. 72(12):513-518; 1977.

The effectiveness of silymarin (3 x 140 mg/day,
p.o.) was studied in 51 patients with acute viral
hepatitis. Thirty-two patients were hepatitis B
surface antigen (HBsAg)-positive. A similar grou
of 100 patients served as controls (61 patients
HBsAg-positive). Laboratory tests (total serum b
lirubin, SGOT, SGPT, and alkaline phosphatase act
ities and prothrombin time) were performed every
5-7 days over a period of 5 weeks beginning with
onset of jaundice. There were no statistically
nificant differences between the treated group a
controls during normalization of the biochemical
parameters. The findings indicate that silymari
has no favorable effect on the course of acute v
hepatitis.

5088 METABOLISM OF HEXOBARBITAL IN PATIENTS WITH ACUTE HEPATITIS AND CIRRHOSIS. (

Richter, E.; Gallenkamp, H.; Keller, B.; Brachte
D.; Zilly, W.; Breimer, D. D. (Medizinischen Uni
ersitatsklinik Wurzburg, Josef-Schneider-Strasse
8700 Wurzburg, W. Germany). *Z. Gastroenterol.* 6
381-388; 1977.

The metabolism of hexobarbital (HB; 7.32 mg/kg b
i.v. infusion in 60 min) was studied in 16 patie
with acute hepatitis, 18 patients with liver cir
rhosis, and in 21 volunteers. Plasma HB was det
mined by gas chromatography, and HB clearance wa
calculated from the plasma-concentration curve
versus time. Additional experiments were perfor
in rats with galactosamine-induced hepatitis. H
clearance was normal in half of the patients wit
acute hepatitis, but it was diminished in the ot
half. However, serum bilirubin level, SGPT, and
factor V activity were similarly pathological in
both groups. The clearance of HB did not correl
with its half-life. The 18 cirrhotic patients
were subdivided into two groups: those with com
pensated cirrhosis and those with the decompensa
form plus ascites and esophageal varices. Nearl

ll the cirrhotics had a diminished HB clearance, specially the latter group. In the volunteers, 0-60% of the administered dose was excreted as eto-HB, compared with 10-20% in the acute hepa- itis patients and only 5% in the cirrhosis patients. ver 90% of HB was eliminated within 24 hr in all hree groups. Rats with galactosamine hepatitis howed diminished HB clearance, which can be attrib- ted to a decreased microsomal cytochrome P450 con- ent and an increase in the half-life of HB.

089 RENAL CLEARANCE OF GLUCURONATE-CONJUGATED BILIRUBIN FRACTIONS IN VARIOUS TYPES OF AUNDICE. III. JAUNDICE RESULTING FROM ACUTE IFFUSE LIVER DISEASE. (Spa.) Candel Monserrate, .; Diaz-Rubio Garcia, M. (Hospital Clinico San arlos, Madrid, Spain). *Rev. Esp. Enferm. Apar. ig.* 46(3):257-270; 1975.

enal clearance of glucuronate-conjugated bilirubin raction was evaluated in nine patients with diffuse cute hepatopathies: spherocytosis and post-trans- usion acute hepatitis (1/9), acute viral hepatitis 7/9), and acute viral hepatitis with Malta Fever 1/9). The following measurements were taken: irect- and indirect-reacting bilirubin in blood and rine; mono- and diconjugated bilirubin in blood and rine; pH, density, albumin level, and volume of rine; creatinine clearance; renal clearance of bili- rubin; blood pH; serum albumin, and gammaglobulins; romine; prothrombin; SGOT, SGPT, and acid and alka- line phosphatases. As in normal subjects and atients with hemolytic jaundice, the monocon- jugated fraction predominates in blood and the iconjugated fraction in urine; renal clearance f the diconjugated fraction was greater than clear- nce of the monoconjugated fraction. Renal clear- nce of both fractions was significantly lower in hese patients than in normal controls ($p<0.01$ for he monoconjugated fraction; $p<0.05$ for the dicon- jugated fraction). Renal clearance of both con- jugated fractions did not differ significantly among hese patients and patients with other types of jaundice (including hemolytic anemia, diffuse chronic hepatopathy, tumor hepatopathy, or obstruc- tive jaundice). Direct-reacting bilirubin predominated over indirect-reacting bilirubin in both blood and urine. A good correlation was also recorded between monoconjugated levels in urine and clearance. As in the controls, no correlation was shown between bilirubinemia and bilirubinuria, and no relationship was discovered between clearance and blood pH.

5090 SMALL VIRUS PARTICLES IN FAECES OF PATIENTS WITH INFECTIOUS HEPATITIS (HEPATITIS A). (Eng.) Skidmore, S. J.; Boxall, E. H. (East Birmingham Hosp., Birmingham B9 5ST, England). *J. Med. Microbiol.* 10(1):43-48; 1977.

Fecal samples from 41 patients with infectious hepatitis and their contacts were investigated for the presence of hepatitis A-associated viral particles. Immune electron microscopy or cesium chloride density-gradient centrifugation revealed viral particles in 16 patients. The latter method was invaluable in detecting small numbers of viral particles. The particles had a buoyant density of 1.34-1.35 and a size range of 21-28 nm. In several samples, tailed phages were identified, but always at a different buoyant density from that of hepatitis-A-associated particles. Cesium chloride density-gradient centrifugation was carried out in six fecal suspensions from which Echovirus type 19 had been isolated. This virus also banded at density 1.34, and its size (25-26 nm) was similar to that of hepatitis A-associated particles. However, hepatitis A-associated particles caused no cytopathic effects in Hep-2 cells, whereas Echovirus recovered from gradients did.

5091 ACUTE VIRAL HEPATITIS. TREATMENT WITH CYTOSINE ARABINOSIDE. (Spa.) de la Torre Fernandez, J. M.; Montero Vazquez, J.; Capote Armas, L. F.; Dominguez Carmona, A. (Hospital Militar Central "Gomez Ulla," Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(5):607-620; 1977.

5092 CLINICAL CHARACTERISTICS AND COURSE OF VIRAL HEPATITIS IN INFANTS DURING THE FIRST YEAR OF LIFE. (Rus.) Chaplygina, G. V. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 21(10):23-25; 1976.

5093 DIAGNOSTIC VALUE OF THE ALLERGEN LEUKOCYTOSIS REACTION IN SERUM HEPATITIS AS COMPARED WITH THE AUSTRALIA ANTIGEN TEST. (Rus.) Pyntia, V. E. (Kishinev Medical Inst., Kishinev, USSR). *Lab. Delo* (10):614-616; 1976.

5094 HEPATITIS B SURFACE ANTIGEN AND HEPATOCYTE MEMBRANE [Abstract]. (Ger.) Bianchi, L.; Gudat, F. (Institut fur Pathologie, Universitat Basel, Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(21):746; 1977.

5095 AUSTRALIA ANTIGEN AND α-FETOPROTEIN IN CHRONIC LIVER DISEASES. (Rus.) Lorie, N. Iu.; Ostrovskaia, A. I.; Semendiaeva, M. E. (E. M. Tareev Academic Group, USSR Acad. Medical Sciences, Moscow, USSR). *Sov. Med.* (5):91-95; 1976.

5096 STUDY OF ALPHA-FETOPROTEINEMIA IN VIRAL HEPATITIS. (Pol.) Boron-Kaczmarska, A.; Sokolewicz-Bobrowska, E.; Hermanowska-Szpakowicz, T. (Klinika Chorob Zakaznych Instytutu Chorob Wewnetrznych AM, ul. Zurawia 14, 15-540 Bialystok, Poland). *Wiad. Lek.* 29(22):1999-2001; 1976.

5097 STUDY OF THE PREKALLIKREIN-KALLIKREIN SYSTEM OF THE BLOOD PLASMA IN VIRAL

HEPATITIS. (Rus.) Veremeenko, K. N.; Mitchenko, I. K.; Gontar', A. M. (Kiev Advanced Training Inst. Physicians, Kiev, USSR). *Vrach. Delo* (10):132-134; 1976.

5098 PERIARTERITIS NODOSA AND HEPATITIS. IMMUNOLOGICAL-ULTRASTRUCTURAL STUDY OF TWO CASES: DETECTION OF A VIRUS IN THE HEPATIC LESIONS [Abstract]. (Fre.) Thery, J. P.; Stoebner, P.; Fournet, J.; Girona, G. C.; Roche, J.; Bonnet-Eymard, J. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(3):307; 1977.

See also, 4750, 4779, 4780, 5024, 5027, 5066, 5102
5104.

LIVER AND BILIARY TRACT

Chronic Hepatitis

5099 CHRONIC ACTIVE HEPATITIS IN CHILDREN. A CLINICAL AND IMMUNOLOGICAL LONG-TERM STUDY. (Eng.) Lidman, K.; Biberfeld, G.; Sterner, G.; Norberg, R. (Danderyd Hosp., S-18203 Danderyd, Sweden). *Acta Paediatr. Scand.* 66(1):73-79; 1977.

The clinical course, liver function tests, immunoglobulins, autoantibodies, and antibodies to measles and rubella were followed in seven children (aged 9-15 yr) with chronic active hepatitis (CAH) on immunosuppressive therapy. Their course was followed 1-10 yr after the initiation of immunosuppressive therapy. No patient had known contact with viral hepatitis A or B or with hepatotoxic drugs. In five cases, the onset of disease was acute with nausea, fatigue, and jaundice. One patient had measles 1 month before she developed jaundice and the remaining patient had rubella 6 months before the onset of jaundice. All patients had markedly increased IgG (peak levels in each patient, 17.9-51.4 g/1), high titers of smooth muscle antibodies (SMA; highest titers recorded in each patient, 100-800), and antinuclear antibodies of the IgG class in the earliest serum specimens tested. Therapy resulted in an improved sense of well-being and a decrease in SGOT, IgG, and SMA titers. Very high titers of measles antibodies (Morbilli HI titer, 80-12,800; Morbilli HLI titer 640-40,960) were observed in all cases. One patient died of liver failure after 5 yr of illness. The other patients have survived and are able to live a normal life. The possibility of CAH should be considered when children develop symptoms of hepatitis. Long-term immunosuppressive treatment with regular clinical and laboratory evaluation and the estimation of SMA titers are useful in young patients with CAH.

5100 HISTOPATHOLOGICAL FEATURES IN MIXED TYPES OF CHRONIC AGGRESSIVE HEPATITIS AND PRIMARY BILIARY CIRRHOSIS: CORRELATIONS OF LIVER HISTOLOGY WITH MITOCHONDRIAL ANTIBODIES OF DIFFERENT SPECIFICITY. (Eng.) Kloppel, G.; Seifert, G.; Lindner, H.; Dammermann, R.; Sack, H. J.; Berg, P. A. (Pathologisches Institut, Universitat Hamburg, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 373(2):143-160; 197

Studies were carried out to determine whether the liver histopathology of 14 patients with chronic inflammatory liver disease, cholestasis, and mitochondrial antibodies against mitochondrial antigen fractions of 1.19 density (primary biliary cirrhos [PBC] antigen) differs from that of 13 patients with antibodies against fractions of 1.13 density chronic active hepatitis-primary biliary cirrhosis [CAH-PBC] mixed-type antigen). For comparison, th liver biopsies of 17 patients with chronic aggress hepatitis (CAH) and antinuclear and/or antismooth muscle antibodies, but without cholestasis and mit chondrial antibodies, were evaluated. The 14 patients with mitochondrial antibodies against the P antigen showed the typical histological features of PBC. The 13 patients with mitochondrial antibodies against the CAH-PBC mixed-type antigen had heterogenous liver alterations. In 11 cases, high active CAH and/or active postnecrotic cirrhosis (AC) were found, both with augmented ductular proliferation. Some of these cases showed distinct c teria of PBC as early bile duct lesions or absence of regular bile ducts. The liver histology of one case corresponded to classical PBC, another case t chronic persistent hepatitis. The CAH-patients wi out cholestasis and mitochondrial antibodies only occasionally showed bile duct proliferation. A high correlation was found between mitochondrial antibodies against the CAH-PBC mixed type antigen and highly active CAH or early AC with augmented ductular proliferation. This result represents an overlapping of CAH and PBC. In contrast, the case with antibodies reacting to the PBC antigen showed the slowly progressive liver changes of typical PBC.

5101 ANTIBODY TO HEPATITIS B CORE ANTIGEN IN CHRONIC HEPATITIS AND PRIMARY BILIARY

CIRRHOSIS: EVALUATION BY A NEW AUTOLOGOUS SOLID PHASE RADIOIMMUNOASSAY. (Eng.) Grady, G. F.; Kaplan, M. M.; Vyas, G. N. (State Lab. Inst., 305 South St., Boston, MA 02130). *Gastroenterology* 72(4):590-593; 1977.

The antibody to core antigen of hepatitis B virus (anti-HBc), was assayed by a new solid phase sandwich radioimmunoassay inhibition method in the sera of 26 patients with hepatitis B surface antigen (HBsAg)-negative chronic active hepatitis (CAH) and 31 patients with primary biliary cirrhosis (PBC). The sensitivity of the method was validated by finding anti-HBc titers averaging >1:1,000 in a group of chronically HBsAg-positive individuals, four of whom had chronic persistent hepatitis and four of whom had no histological or biochemical evidence of liver disease. However, anti-HBc was not detectable in any of the 26 patients with HBsAg-negative CAH. Sera from 2 of the 31 PBC patients contained anti-HBc but only in low titers, a distribution of anti-HBc similar to that found among a comparison group of 100 normal subjects. Anti-HBc testing among PBC patients and control subjects identified a few persons in whom negative tests for HBsAg and anti-HBs failed to identify previous hepatitis B infections. Nevertheless, the uniformly negative tests for anti-HBc among the HBsAg-negative patients with CAH provide additional evidence that this subgroup, typically young to middle-aged women, seldom derive CAH from hepatitis B infection.

5102 AUTOANTIBODIES, IMMUNOGLOBULINS AND HEPATITIS B ANTIGEN IN CHILDREN WITH CHRONIC LIVER DISEASE. (Eng.) Dubois, R. S. (Royal Alexandra Hosp. Children, Bridge Rd., Camperdown, N.S.W. 2050, Australia). *Aust. Paediatr. J.* 12(3):163-166; 1976.

Smooth muscle antibody, mitochondrial antibody, serum immunoglobulin G levels, and hepatitis B antigen (HBAg) were measured in the sera of 20 children with extrahepatic biliary atresia, 8 with intrahepatic biliary atresia, and 6 with posthepatic (neonatal) cirrhosis. Smooth muscle antibody was not found in any patient with posthepatic cirrhosis, but it was present at dilutions up to 1/40 in four patients with extrahepatic atresia and four patients with intrahepatic atresia. Only four patients with extrahepatic biliary atresia had normal IgM levels, whereas these levels were uniformly normal in the other two groups. Serum IgA was normal in six patients with intrahepatic atresia, but in only two with posthepatic cirrhosis, and in none of the patients with extrahepatic biliary atresia. Serum IgG levels were elevated in 10 patients with extrahepatic biliary atresia, 4 with posthepatic cirrhosis, but in only 1 with intrahepatic biliary atresia. HBAg was absent in the sera of three groups. No patient had mitochon--drial antibody. The absence of HBAg in the patient's sera suggests that persistent hepatitis B antigenemia is not responsible for the perpetuation of the cirrhotic process in biliary atresia or neonatal hepatitis.

5103 SERUM ANTIBODIES AGAINST LIVER AND KIDNEY MICROSOMES. CHARACTERISTICS OF A SUBTYPE OF CHRONIC HEPATITIS. (Spa.) Katz, S.; Radici, J. V.; Roquel, L. (Hospital Escuela Jose de San Martin, Faculdad de Farmacia y Bioquimica, Buenos Aires, Argentina). *Arq. Gastroenterol.* 13(1):13-17; 1976.

Serum antibodies against liver and kidney microsomes were discovered in five patients with various hepatopathies. In four of five patients, the onset of illness occurred before 10 yr of age. The patients are described briefly: a 12-yr-old girl with chronic hepatitis, recurring severe jaundice, and hypertransaminasemia; a 26-month-old girl with highly developed chronic hepatopathy, jaundice, elevated transaminases, and probable developing cirrhosis; a 9-yr-old boy with a fatal case of severe cirrhosis with ascites, splenomegaly, portal hypertension, jaundice, and very high transaminase levels; a 19-yr-old boy with chronic hepatopathy in remission, treated successfully with corticosteroids; and a 26-yr-old woman with recurring prolonged episodes of jaundice. The microsomal antibodies occurred in only 0.14% of 3,560 subjects tested. The authors suggest that the presence of these antibodies is a characteristic of a particular type of chronic hepatopathy, and that systematic examination for the antibodies in cases of infantile jaundice or prolonged or recurring hepatopathies would allow more frequent diagnosis of the pathology.

5104 COMPLEMENT FIXING HEPATITIS B CORE ANTIGEN IMMUNE COMPLEXES IN THE LIVER OF PATIENTS WITH HBs ANTIGEN POSITIVE CHRONIC DISEASE. (Eng.) Rizzetto, M.; Bonino, F.; Crivelli, O.; Canese, M. G.; Verme, G. (Dept. Gastroenterology, Ospedale Mauriziano Umberto I, Turin, Italy). *Gut* 17(11):837-843; 1976.

Immunofluorescence studies were made of 152 biopsies from patients with hepatitis to detect the presence of hepatitis B virus surface antigen (HBsAg) and core antigen (HBcAg), IgG, and human complement-fixing activity. Seventy-two patients had HBsAg in their serum. Strong nuclear and occasionally weak cytoplasmic complement binding was observed in all of the HBcAg-positive biopsies, except in three which were still in the incubation phase of infectious hepatitis. Complement-binding activity or IgG deposits were not seen in HBsAg-negative biopsies, in biopsies positive only for HBsAg in acute self-limited type B hepatitis, or in serologically positive patients with apparently healthy livers or with only minor lesions. The degree of complement binding and HBcAg fluorescence seemed to depend upon the disease activity. The results of this study suggest that the individual immune response is a key determinant in the progression of HBsAg-positive disease and the nature of its development.

5105 TREATMENT OF CHRONIC INFANTILE HEPATITIS WITH D-PENICILLAMINE. (Ger.) Weingartner, L.; Metzke, H.; Rath, F. W.; Baum, W. F.;

Preiss, U.; Heinrichs, I. (Universitats-Kinderklinik, Leninallee 18, DDR-402 Halle, E. Germany). *Klin. Paediatr.* 189(3):211-219; 1977.

Therapeutic results obtained with D-penicillamine (DPA) in 18 children with liver diseases are presented. Seven patients had chronic active hepatitis, 6 chronic persistent hepatitis, 2 subacute hepatitis, and 3 had liver fibrosis, which was developing into cirrhosis in 1. The duration of the diseases prior to therapy was 7 months to 9 yr. The doses of DPA ranged from 15 to 35 mg/kg. Therapy was usually initiated with a daily dose of 100 mg, that was increased by 100-150 mg weekly to a maximum of 1,000 mg/day. The results of the treatment, which lasted from 5 months to 2 yr, were checked by laboratory tests and liver biopsy. Among the children with chronic active hepatitis, cure was achieved in four, good improvement in one, slight improvement in one, and no response in one, Good improvement was achieved in three of six patients with chronic persistent hepatitis, slight improvement in two, and no response in one. One patient with subacute hepatitis was cured, and very good improvement was achieved in the other. The patient with liver fibrosis developing into cirrhosis did not respond, but very good to good improvement was achieved in two others. Two patients were Australia antigen-positive, neither of whom responded to the therapy. Side-effects (proteinuria after 8 months of treatment and gastrointestinal disturbances) were seen in two patients. The findings indicate that Australia antigen-negative, chronic active hepatitis responds particularly well to DPA therapy.

5106 "NONALCOHOLIC" CHRONIC HEPATITIS IN THE ALCOHOLIC. (Eng.) Goldberg, S. J.; Mendenhall, C. L.; Connell, A. M.; Chedid, A. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Gastroenterology* 72(4):598-604; 1977.

The etiology of biopsy-proven chronic active or chronic persistent hepatitis observed in 10 alcoholic patients was studied. In each patient, the responsible etiological agent appeared to be ethanol. Laboratory abnormalities were distinguished statistically from 121 patients with alcoholic hepatiti
their higher SGPT (262 ± 139 versus 62 ± 7 U/ml,
0.001), lower ratio of SGOT:SGPT (1.96 ± 0.34 ver
4.71 ± 0.40, $p<0.001$), and lower WBC (5,833 ± 763
versus 10,370 ± 742/mm^3, $p<0.01$). However, the o
lap between the groups was sufficiently large tha
without histological confirmation the correct diag
nosis was doubtful for any given patient.

5107 A CAUSE OF HYPERAMYLASEMIA ASSOCIATED W
CHRONIC LIVER DISEASE [Abstract]. (Eng
MacGregor, I. L.; Zakim, D. (Veterans Admin. Hosp
San Francisco, CA). *Clin. Res.* 25(2):153A; 1977.

5108 CIRCULATING IMMUNE COMPLEXES IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Galbraith, R. M.; Chenais, F.; Fudenberg, H. H.; Eddleston, A. L. W. F. (Medical Univ. South Carolina, Charleston, SC). *Clin. Res.* 25(3):311A; 1977.

See also, 4781, 5022, 5066, 5075, 5081, 5084.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

5109 POSSIBLE RELATIONSHIP BETWEEN THE RATE OF ETHANOL METABOLISM AND THE SEVERITY OF HEPATIC DAMAGE IN CHRONIC ALCOHOLICS. (Eng.) Ugarte, G.; Iturriaga, H.; Pereda, T. (Casilla 15138, Santiago 11, Chile). *Am. J. Dig. Dis.* 22(5):406-410; 1977.

The rate of ethanol metabolism (EMR) was determined in 10 controls; 15 alcoholics with a normal liver; 17 alcoholics with steatosis; 10 alcoholics with necrosis, severe steatosis, and fibrosis; 4 alcoholics with mild fibrosis; 5 alcoholics with cir-
rhosis with necrosis; and 6 alcoholics with cirrho
sis with liver failure and ascites. The patients
were studied after 9-25 days of abstinence (mean,
15 days). A significant increase in EMR ($p<0.01$)
was found in the alcoholics with hepatic necrosis
(265 ± 20.5 mg/kg/hr) compared to alcoholics with
normal liver histology (154 ± 17 mg/kg/hr) and no
alcoholic controls (159 ± 15 mg/kg/hr). In alcoholics with steatosis but without necrosis, a
lesser increase in EMR (207 ± 20 mg/kg/hr, $p<0.05$

as also observed. Patients with only slight fi- rosis without other abnormalities and cirrhotics ith overt liver failure showed EMR similar to con- rols. This study indicates that the increased ate of ethanol metabolism observed in chronic lcoholics may persist much longer than has been reviously described. The data suggest the neces- ity of performing a longitudinal study correlating he amount of alcohol intake, hepatic histology, nd rates and pathways of ethanol metabolism in lcoholic subjects.

110 AMYLASE, HEPATIC ENZYMES AND BILIRUBIN IN SERUM OF CHRONIC ALCOHOLICS. (Eng.) Skude, .; Wadstein, J. (Malmo General Hosp., Malmo, Sweden). *cta. Med. Scand.* 201(1/2):53-58; 1977.

he concentrations of bilirubin and the activities f aspartate aminotransferase (ASAT, GOT), alanine minotransferase (ALAT, GPT), γ-glutamyltransferase GT), total amylase, and pancreatic isoamylase were etermined in the sera of 182 chronic alcoholic men. Twelve percent of the patients had abnormally igh levels of bilirubin (in comparison with a ref- erence group of 97 male controls), 73% had increased SAT, 53% increased ALAT, and 69% increased GT. The ighest values were found after 5-20 yr of well-documented alcoholism. There were 14 alcoholics ith normal enzyme activities, and all had a history f alcoholism of over 20 yr duration. For all par- ameters, the scatter around the mean was greater in he patients than in the controls. In all alcohol- ics, the mean values of ASAT and ALAT activities ere significantly increased ($p<0.001$) in compar- ison with controls. The 48 patients who had had ttacks of delirium tremens showed slightly higher SAT and ALAT activities than did other alcoholics. he mean pancreatic isoamylase level in the serum was decreased in the groups with long-standing alcoholism when compared with the reference group. he frequency of subnormal serum pancreatic amylase was 2% in the reference group, 12% in patients with a 1- to 5-yr history of alcoholism, 19% in patients with a 5- to 10-yr history, 23% in patients with a 10- to 20-yr history, and 26% in patients with a greater than 20-yr history. The combination of ASAT and GT determination was the most sensitive assay in detecting hepatic or extrahepatic ethanol damage.

5111 SERUM LIPIDS IN ALCOHOLIC PATIENTS WITH AND WITHOUT CIRRHOSIS OF THE LIVER, WITH PARTICULAR REFERENCE TO ENDOGENOUS FAMILIAL HYPERTRIGLYCERIDEMIA. (Eng.) Patek, A. J.; Earampamoorthy, S. (Veterans Admin. Hosp., 150 South Huntington Ave., Boston, MA 02130). *Am. J. Clin. Nutr.* 29(10):1122-1126; 1976.

The frequency of hypertriglyceridemia in 40 cirrhotic and 40 noncirrhotic alcoholic patients was investigated. Normal fasting triglycerides (90.6 ± 37.8 and 100.1 ± 36.8 mg/100 ml), total serum cholesterol (179.8 ± 56.5 and 186.9 ± 43.0 mg/100 ml) and fasting blood glucose (102.7 ± 27.8 and 100.5 ± 20.3 mg/100 ml) were found in cirrhotic and noncirrhotic patients, resp.; however, a marked difference in hepatic function tests, e.g., bilirubin (3.2 ± 3.9 and 0.5 ± 0.2 mg/100 ml, $p<0.01$), albumin (2.6 ± 0.8 and 4.1 ± 0.6 g/100 ml, $p<0.01$), alkaline phosphatase (146.9 ± 64.0 and 74.8 ± 30.2 U, $p<0.01$), and SGOT (87.7 ± 62.9 and 32.6 ± 18.6 U, $p<0.01$) were seen in the two types of patients. There was very little evidence of hepatic disease in noncirrhotic alcoholic patients. It is suggested that the frequency of cirrhosis in the general population was not materially affected by subjects with endogenous familial hypertriglyceridemia (type IV hyperlipoproteinemia) even though they showed an exaggerated lipidemic response to ingestion of alcohol. However, these patients might be predisposed to hepatic cirrhosis.

5112 THIAMINE, RIBOFLAVIN, AND PYRIDOXINE SUPPLY IN CHRONIC ALCOHOLISM. (Ger.) Hell, D.; Six, P. (Psychiatrische Universitats-Poliklinik, Petersgraben 1, CH-4004 Basel, Switzerland). *Dtsch. Med. Wochenschr.* 102(26):962-966; 1977.

The thiamine (vitamin B_1), riboflavin (vitamin B_2), and pyridoxine (vitamin B_6) supply was studied in 50 chronic alcoholics and compared with the data for 1,152 healthy controls. Thiamine was determined by the transketolase activation test, riboflavin by the glutathione reductase activation test, and pyridoxine by the glutamic-oxalacetic transaminase test on RBC. The alcoholics had a reduced thiamine and riboflavin supply compared with the controls. A high risk of thiamine deficiency was found in 47.1% of the alcoholics; 13.9% had a risk of riboflavin deficiency. There appeared to be no correlation between thiamine and riboflavin supply. However, there was a significant positive correlation between thiamine supply and hemoglobin (Hb) or diastolic pressure, and significant negative correlations between thiamine supply and bilirubin or γ-globulins and between riboflavin supply and Hb. In the control group, the risks of thiamine and riboflavin deficiency were 2% and 0.4%, resp. The findings indicate that anemia is associated with a reduced thiamine or riboflavin supply. The enzymatic determination of pyridoxine seemed to be influenced by alcohol or by its metabolic processes; therefore, it is not a suitable determinant in chronic alcoholism.

5113 CARCINOEMBRYONIC ANTIGEN, ALCOHOL, AND CIRRHOSIS. (Fre.) Massart, J. P.; Meriadec, B.; Klepping, C.; Martin, F. (Service de Gastro-Enterologie, Faculte de Medecine, blvd. Jeanne d'Arc, 21000 Dijon, France). *Bull. Cancer (Paris)* 63(4):639-648; 1976.

Carcinoembryonic antigen (CEA) levels were measured in the sera of 43 patients with acute alcoholism and in 84 patients with chronic alcoholism (CA) plus cirrhosis of the liver. Liver function tests were also conducted, and α-fetoprotein levels were measured in 69 sera. Histological examination by laparoscopy revealed cirrhosis in 45/84 CA patients;

this finding was also confirmed in 10 others by clinical and biological tests. The CEA level exceeded the normal value of 10 ng/ml in 43/84 CA patients, reaching a maximum of 50 ng/ml. No statistical significance was noted between clinically latent and decompensated cirrhosis. The mean CEA level did not differ with respect to hepatocellular insufficiency. However, the CEA level increased when albumin levels dropped, and it was more elevated in patients with cirrhosis plus biliary retention. No correlation was found between CEA, α-fetoprotein, and other biological tests in the CA patients. Of the 43 acute alcoholism patients, 36% had a CEA level >10 ng/ml. The difference between the two groups is statistically significant.

5114 DUPUYTREN'S CONTRACTURE AND CHRONIC ALCOHOLISM. SEARCH FOR PATHOGENIC RELATIONSHIP WITH HL-A GROUPS. (Fre.) Aron, E. (Clinique medicale A, Centre Hospitalier Bretonneau, 2, bd Tonnelle, 37000 Tours, France). *Sem. Hop. Paris* 53(2):139; 1977.

The pathogenic relationship of Dupuytren's contracture (DC) and chronic alcoholism (CA) with histocompatibility (HL-A) antigens is reviewed briefly. There is a higher incidence of Dupuytren's contraction and chronic alcoholism in Caucasian men, usually developing after 50 yr of age. Stellar angiomas, palmar erythrosis, and DC are signs of CA. Of 116 patients with cirrhosis of alcoholic origin, stellar angiomas were observed in 73%, palmar erythrosis in 47%, and DC in 35% of the cases. The coexistence of all three lesions in 13% of the group attests to the seriousness of the hepatic disease. The occurrence of HL-A was similar in the patients and in controls. Apparently there is no genetic predisposition to DC or CA. Treatment of DC by the cytostatic drug, methyl hydrazine, and complete abstention from alcohol have been proposed.

5115 BACTERIAL FUNCTION OF PERITONEAL MACROPHAGES IN PATIENTS WITH ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Goldman, R. D.; Tong
M. J.; Lam, K. C.; Depew, W.; Triger, D. (Univ.
Southern California Sch. Medicine, Los Angeles, C
Clin. Res. 25(2):109A; 1977.

5116 PREVENTION OF ETHANOL-INDUCED FATTY LIV
BY DIETARY ADDITIVES: MEASUREMENT OF
FATTY ACID OXIDATION, PYRUVATE DECARBOXYLASE AND
TCA CYCLE ACTIVITY [Abstract]. (Eng.) Stanko, R
T.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, P
Clin. Res. 25(3):469A; 1977.

5117 THE NATURAL HISTORY OF GASTROINTESTINAL
BLEEDING IN PATIENTS WITH ALCOHOLIC CIR
RHOSIS. DESCRIPTION OF A SUBGROUP OF PATIENTS WI
HIGH RISK OF BLEEDING RECURRENCE [Abstract]. (En
Degos, F.; Rueff, B. (Hopital Beaujon, Clichy, France). *Digestion* 15(3):237-238; 1977.

See also, 4725, 4763, 4895, 4988, 5034, 5106, 512

LIVER AND BILIARY TRACT

Cirrhosis

5118 SEQUENTIAL HEPATOSPLENIC SCINTIGRAPHY FOR MEASUREMENT OF HEPATIC BLOOD FLOW. (Ger.) Biersack, H. J.; Thelen, M.; Schulz, D.; Knopp, R.; Dahlem, R.; Schmidt, R.; Winkler, C. (Institut fur klinische und experimentelle Nuklearmedizin, 5300 Bonn-Venusberg, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 126(1):47-52; 1977.

Hepatic blood flow was measured in 21 patients with liver cirrhosis and portal hypertension and in 10 healthy subjects with a normal liver by sequential hepatosplenic scintigraphy using i.v. ^{99m}Tc-pertechnetate. Pictures were taken by a gamma camera at a rate of 1/sec for 60 sec. The proportion of port
flow averaged 71.1 ± 1.8% in the healthy subjects
versus 20.6 ± 1.5% in the patients. The findings
indicate the considerable value of scintigraphy i
the preoperative diagnosis and postoperative foll
up of portal hypertension.

5119 COMPARISON OF LACTULOSE AND NEOMYCIN I
THE TREATMENT OF CHRONIC PORTAL-SYSTEM
ENCEPHALOPATHY: A DOUBLE BLIND CONTROLLED TRIAL.
(Eng.) Conn, H. O.; Leevy, C. M.; Vlahcevic, Z.

Rodgers, J. B.; Maddrey, W. C.; Seeff, L.; Levy, L. L. (Veterans Admin. Hosp., West Spring St., West Haven, CT 06516). *Gastroenterology* 72(4):573-583; 1977.

A randomized double-blind clinical comparison of neomycin and lactulose was carried out in 33 cirrhotic patients with chronic portasystemic encephalopathy. Sorbitol syrup was used as a control solution along with neomycin and was compared with lactulose syrup and placebo tablets in a double drug protocol. Twenty-nine patients were studied in a crossover investigation in which each received both therapeutic regimens preceded and followed by control periods. Four additional patients received one or the other agent, but did not receive both. Serial, semiquantitative assessments were made in all patients of mental status, asterixis, the trailmaking test (TMT), electroencephalograms (EEG), and arterial ammonia levels. Both neomycin-sorbitol and lactulose were effective in the majority of patients (83 and 90%, resp.). Each of these parameters--mental state, asterixis, TMT, EEG, and NH--was improved significantly by neomycin-sorbitol and lactulose. The post-treatment levels for each of these measures were similar in the neomycin and lactulose-treated groups. Mean stool pH was reduced by neomycin/sorbitol to 6.1 and by lactulose to 5.5 ($p<0.001$). Bowel activity was similar in the two groups. Both drugs were free of toxicity. These investigations demonstrate that both lactulose and neomycin-sorbitol are effective in the treatment of chronic portasystemic encephalopathy.

5120 IMMUNOGLOBULINS AND LIVER CIRRHOSIS: PERSONAL EXPERIENCE.

(Spa.) Cuartero, A. R.; Carril, J. N.; Mora Lara, R. J. (Departamento de Medicina Interna, Catedra de Patologia Medica, Universidad de Granada, Granada, Spain). *Med. Clin.* 65(5):230-233; 1975.

Serum levels of IgG, IgA, and IgM increase in patients with hepatic cirrhosis. Levels were measured in 17 healthy subjects and in 43 patients with hepatic cirrhosis of one of the following types: nutritional alcoholic (20), cryptogenic (14), and posthepatitis (9). No significant differences were noted between Ig levels of patients with different types of cirrhosis, but the patients generally had higher Ig levels than did normal subjects. In 32/43 cases, the levels of IgA, IgG, and IgM were higher; in 6/43 cases IgG and IgA were higher, and in 4 cases IgG and IgM were higher than levels in normal subjects. Several theories are advanced to explain the mechanism of hypergammaglobulinemia in cirrhosis, including hyperfunction of the reticuloendothelial system, reciprocal regulation of plasma proteins and liver, alterations of synthesis and metabolism of immunoglobulins, and plasmocytosis.

5121 EFFECT OF ARGININE KETOGLUTARATE ON THE DETOXIFYING CAPACITY OF THE CIRRHOTIC LIVER.

(Ger.) Muting, D.; Horbach, L. (HEINZ-KALK-Klinik fur Innere Medizin-Gastroenterologie, am Gradierbau, D-8730 Bad Kissingen, W. Germany). *Munch. Med. Wochenschr.* 119(16):535-538; 1977.

The effect of arginine ketoglutarate (3 x 3 g/day, p.o.) on the detoxifying capacity of the liver was studied in 25 patients with liver cirrhosis by determining plasma ammonia and free phenol levels. The patients were on a high-protein diet. They included 10 patients without portal hypertension and 15 with portal hypertension. Compared with the levels measured on the day before treatment, arginine ketoglutarate caused a significant reduction in plasma ammonia and free phenols. The reduced ammonia level was due to a significant enhancement of urea synthesis, measured by the urea nitrogen content in the 24-hr urine. The simultaneous lowering of the free phenol levels can be explained by an improved oxidative decomposition of these substances. Arginine ketoglutarate caused no marked stimulation of insulin secretion.

5122 RENIN LEVELS WITH AND WITHOUT STIMULATION IN LIVER CIRRHOSIS. RELATIONSHIP WITH THE EFFECTIVE RENAL PLASMA FLOW.

(Spa.) Lissen Otero, E.; Gonzalez, M.; de la Rasilla, G.; de Pesquera, F. G.; Fernandez Andrade, C.; Crespo Diez A.; Andreu Kern, F. (Ciudad Sanitaria "Virgen del Rocio," (BR, after 12 hr rest), renin after stimulation *Dig.* 47(6):795-798; 1976.

Plasma renin levels and effective plasma renal flow (EPRF) were evaluated in 31 patients with hepatic cirrhosis after they were maintained for 1 week without drugs on a low-sodium diet (40-50 mEq/day). The following parameters were measured creatinine, urea, creatinine clearance, basal renn (BR: after 12 hr rest) and renin after stimulatio (SR, following 2 hr exercise), EPRF, salt tolerance, and water tolerance. Results were compared to those of 19 normal subjects. In 9/31 patients, renal function was entirely normal in all parameters (roup I); 11/31 patients (group II) had a normal EPRF (<450 cm^3/min); and 10/31 patients (group III) hd an EPRF lower than normal (<450 cm^3/min). The remaining 1/31 is not discussed. In all cases presented, stimulation increased plasma renin leves considerably. In groups I & II, SR values were significantly higher in cirrhosis patients than in normal subjects (3.11 ± 2.16, 2.80 ± 1.67, 1.50 ± 0.51, resp., $p<0.005$; no units were given for SR and BR values). In group III, both BR and R values were significantly higher in patients than in normal subjects (11.76 ± 7.40 and 1.50 ± 0.51, resp.; $p<0.0005$). A strong correlation was noted, therefore, between renin levels and EPRF, the highest plasma renin levels occurring in those patients with the lowest EPRF.

5123 COMPARATIVE STUDY OF URINARY EXCRETION RATES OF PARA-HYDROXY-MANDELIC ACID, HOMOVANILLIC ACID, VANYLMANDELIC ACID IN CIRRHOTIC PATIENTS WITH AND WITHOUT ENCEPHALOPATHY.

Eng.) Zoghbi, F.; Emerit, J.; Fermanian, J.; Bousquet, O.; Legrand, J. C.; Sarrazin, A.; Desgrez, P. (Pitie-Salpetriere, 91 Boulevard de l'Hopital, 75634 Paris

Cedex 13, France). *Biomedicine* [*Express*] 27(1): 37-40; 1977.

To test the hypothesis that false neurotransmitters accumulate in hepatic encephalopathy, the urinary excretion of octopamine, dopamine, and noradrenalin catabolic products (parahydroxymandelic acid, PHMA; homovanillic acid, HVA; and vanylmandelic acid, VMA) were determined in 27 cirrhotic patients with (11) and without (16) portasystemic encephalopathy (PSE). The mean PHMA, HVA, and VMA levels were significantly higher in the patients with PSE (5.12 ± 1.79, 6.75 ± 3.58, and 2.83 ± 1.59 mg/24 hr, resp.) than in the patients without PSE (2.40 ± 1.08 mg/24 hr, $p<0.001$; 3.88 ± 2.73 mg/24 hr, $p<0.02$; and 1.88 ± 0.89 mg/24 hr, $p<0.06$, resp.). There was a significant correlation between PHMA and HVA levels ($r=0.721$, $p<0.02$) and between PHMA and VMA levels ($r=0.079$, $p<0.01$). The higher excretion of PHMA in the patients with PSE suggests increased octopamine metabolism. The increased HVA and VMA excretion, as well as the positive correlations between PHMA and HVA and PHMA and VMA, could be explained by a depletion in stored dopamine and noradrenalin. These observations support the hypothesis that octopamine acts as a false neurotransmitter, and the resulting depletion of dopamine and noradrenalin could explain the neuropsychic phenomena of PSE.

5124 PLASMA PROLACTIN AND PROLACTIN RELEASE IN LIVER CIRRHOSIS.

(Eng.) Wernze, H.; Schmitz, E. (Medizinische Universitatsklinik, Josef-Schneider-Str. 2, 8700 Wurzburg, W. Germany). *Acta Hepatogastroenterol.* 24(2):97-101; 1977.

Plasma prolactin levels were determined by radioimmunoassay in 75 patients with cirrhosis, 27 controls with nonhepatic diseases, and 23 healthy controls. The mean basal prolactin level in the cirrhotic patients (8.5 ± 4.5 ng/ml) was significantly higher than that in controls (5.5 ± 1.7 ng/l, $p<0.001$). The extent and incidence of hyperprolactinemia were more pronounced in the 48 patients with alcoholic cirrhosis than in the 27 patients with nonalcoholic cirrhosis (9.7 ± 4.8 versus 5.7 ± 2.1 ng/ml, $p<0.005$). There was no correlation between the prolactin level and ascites formation or the development of gynecomastia. The prolactin response to thyrotropin releasing hormone (400 μg, i.v.) in all cirrhotic patients was 6.6-fold higher than the basal prolactin level, whereas that of the controls was only 3.9-fold higher. The prolactin response of the alcoholic patients was significantly higher than that of the nonalcoholic patients. It is possible that hyperprolactinemia and increased pituitary hormone reserve reflects hyperestrogenism, but changes of the hypothalamic regulation cannot be excluded.

5125 THE KIDNEY IN CIRRHOSIS.

(Eng.) Wilkinson, S. P. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5 8RX, England). *Tijdschr. Gastroenterol.* 19(3):155-169; 1976.

Different mechanisms leading to sodium and water retention in cirrhosis, the development of renal failure, and the role of the kidney in the production of ascites are reviewed. Abnormalities of renal function are almost invariable in cirrhosis at some stage. These include hemodynamic alterations, renal failure, abnormal electrolyte handling, renal tubular acidosis, glomerular lesions, diabetic nephropathy, interstitial nephritis, and bacterial pyelonephritis. The "overflow theory" of the relation between renal function and ascites formation is based on the hypothesis that the primary abnormality is renal sodium and water retention; this is localized to the peritoneal compartment if portal pressure and plasma oncotic pressure are sufficiently altered to favor fluid transudation. Mechanisms of sodium retention involve two factors: aldosterone and, in the late stages of disease, reduced renal perfusion. Although water is retained secondary to sodium to restore osmotic equilibrium when ascites is forming, the degree of water retention may be greater than the degree of sodium retention and may result in dilutional hyponatremia. Factors involved in water retention include high circulating antidiuretic hormone, increased proximal sodium resorption, the glomerular filtration rate, the amount of solute excreted, and the intrarenal distribution of plasma flow. Renal failure occurs in up to 84% of patients dying of cirrhosis. The nature of renal failure, clinical picture, mechanisms, observations from renal and hepatic transplantation, treatment, and causes of renal failure are discussed. This entity is associated with an intense reversible constriction of the renal vasculature.

5126 OCULAR FUNCTION IN CIRRHOSIS OF THE LIVER.

(Eng.) Krogh, E.; Ring-Larsen, H. (Fuglegardsvaenget 1, 2820 Gentofte, Denmark). *Acta Ophthalmol. (Kbh.)* 55(1):103-110; 1977.

Ophthalmological parameters were investigated in 28 nonalcoholic women with liver cirrhosis. Of the 20 patients who underwent a complete color vision test (Ishihara pseudoisochromatic plates, the Nagel anomaloscope, the Farnsworth 28-hue test, and the Farnsworth 100-hue test), 3 demonstrated acquired color vision defects; 2 patients had increased serum bilirubin levels. Visual acuity, visual field, intraocular pressure, binocular function, slit lamp microscopy, ophthalmoscopy, and tear production were normal in all cases. The results suggest that the frequency of color vision defects is increased in nonalcoholic cirrhotic patients and that alcohol abuse is not a prerequisite for color vision defects in cirrhotic patients.

5127 INFECTED ASCITES IN LIVER CIRRHOSIS. REPORT OF 15 CASES.

(Spa.) Sendra Salillas, S. J.; Gomez Saez, J. M.; Aranda Torres, A. (Ciudad Sanitaria "Francisco Franco," Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):751-758; 1976.

Bacterial infection of ascitic fluid is an extremely serious complication of hepatic cirrhosis; the clinical courses of 15 patients who developed infections are described. In all patients, death occurred within 11 days of the onset of symptoms. Symptoms were ascites (15), abdominal pain (12), fever (11), shock (10), hepatic precoma (7), jaundice (6), digestive hemorrhage (5), and signs of peritonitis (4). The following bacteria were isolated in the frequencies indicated: *Escherichia coli* (9), *Klebsiella* (2), *Staphylococcus* (1), *Diplococcus pneumoniae* (1), and a combination of *E. coli* and *Streptococcus* (1). All patients were treated with parenterally administered full-spectrum antibiotics, with additional anti-shock therapy, transfusions, and massive doses of corticosteroids or vasoconstrictors when necessary. The three patients who survived the longest (11 days) received more aggressive treatment, including laparatomy, drainage of ascitic fluid, local antibiotics, and related peritoneal lavage. Their deaths were attributed to hepatic insufficiency. Possible sources of the infection are urinary infection, previous sepsis, digestive tube via a change in intestinal flora, and failure of the bacterial filtration activity of the reticuloendothelial system of the liver. A second theory proposes contamination via transmural migration or exogenous contamination (e.g., from laparotomy or paracentesis). The only possibility of effective treatment seems to be early detection by paracentesis and bacteriological examination of the peritoneal exudate, followed by early general and local treatment.

5128 HYPERGASTRINEMIA IN CIRRHOSIS OF LIVER.

(Eng.) Lam, S. K. (Queen Mary Hosp., Hong Kong). *Gut* 17(9):700-708; 1976.

The relationship of acid and gastrin release was examined in 40 cirrhotic patients, and an attempt was made to correlate the findings with the severity of disturbance of liver function and the morphology of the gastric mucosa. In addition, the effect of a portasystemic shunting operation on acid and gastrin release was also studied. The mean basal acid output (BAO) and post-pentagastrin acid output (MAO) of the cirrhotic patients (0.9 ± 0.3 mmol/hr and 6.7 ± 1.2 mmol/hr, resp.) were significantly lower than those in 20 normal controls (2.3 ± 0.3 mmol/hr and 13.6 ± 1.1 mmol/hr, resp.). The mean fasting gastrin level in the cirrhotic patients (41.6 ± 3.1 pmol/l) was significantly higher than that of controls (26.3 ± 3.4 pmol/l), and the postprandial gastrin response was significantly increased and prolonged in the cirrhotic patients. The MAO and integrated gastrin response of the cirrhotic patients did not correlate with the degree of liver function impairment. In five cirrhotic patients, fasting and postprandial gastrin levels remained unchanged after splenorenal shunt operation. A more consistent abnormality of the gastric mucosa as assessed by endoscopy and biopsies appeared to be mucosal congestion with occasional atrophic gastritis. The severity of mucosal abnormality, however, was unrelated to the degree of hypoacidity. The results indicate that the hypergastrinemia in cirrhotic patients is a reflection of gastric hypoacidity and bears no direct relationship to hepatic dysfunction; in addition, the gastric hypoacidity does not accrue solely from mucosal abnormality. This hypoacidity may result from the presence of excessive amounts of circulating acid-inhibiting intestinal peptides, which the diseased liver fails to metabolize.

5129 ANGIOGRAPHY IN THE INVESTIGATION OF PRE-OPERATIVE PORTAL HYPERTENSION. (Fre.)

Dagnelie, J.; Bollaert, A.; Lambilliotte, J. P. (Services de Radiologie, Hopital Universitaire Saint-Pierre, Brussels, Belgium). *J. Belge Radiol.* 59(1):51-70; 1976.

Various angiographic techniques for the diagnosis of portal hypertension (PH) secondary to cirrhosis, including splenoportography (SP), umbilicoportography (UM), ileoportography (IL), hepatic angiography (HA), and subhepatic phlebography (SB), are compared. Direct SP reveals very precise information on the reflux of splanchnic blood in the venous plexus between the splanchnic and cava veins. However, SP does not reveal thrombosis of the portal vein, which occurs in 10% of cirrhotic patients, and the procedure is not indicated in cases of ascites. UM gives good to excellent results in the detection of cirrhosis and hepatic metastases. Together with retrograde catheterization, UM yields precise information on the splenoportal venous axis and venous plexus originating from the portal flux, and it gives immediate results on the permeability of the portal vein. It may be used in splenectomized patients and in cases of ascites or hemorrhagic diathesis. However, an 8%-20% failure rate has been reported with UM. IL yields information about the portal phlebogram and the sinusoidal phase, as well as the derivative venous networks and intrahepatic portal flow. However, it does not give clear data concerning the existence of organic or functional thrombosis of the portal vein. Indirect SP by selective arteriography yields the same information as IL plus detailes of the hepatic arteriogram. HA provides the best results for demonstrating postcirrhotic hepatoma. Manometry and SB provide information about portal and corrected sinusoidal pressure, the morphology of the suprahepatic veins and sinusoids, and the existence of hepatofugal portal circulation. These measures are especially useful in providing hemodynamic and morphological information for surgical treatment. Subhepatic SB, followed by HA, is concluded to be the best diagnostic procedure for PH secondary to cirrhosis.

5130 ENDOGENOUS PLASMA HISTAMINE AND "HEPATOGENIC" GASTRIC ULCER IN LIVER CIRRHOSIS.

(Ger.) Stopik, D.; Hampel, K. E.; v. Kleist, D. (Abteilung fur Innere Medizin mit Schwerpunkt Gastroenterologie, Klinikum Charlottenburg, Freien Universitat, Spandauer Damm 130, 1000 Berlin 19, W. Germany). *Dtsch. Med. Wochenschr.* 102(25):932-933; 1977.

Plasma histamine levels were determined in the venous blood of 10 patients with liver cirrhosis plus solitary or multiple gastric ulcers, 10 patients with stages I-II fatty liver, and 16 normal control subjects. The plasma histamine level averaged 1.3 ± 0.4 µg/l in the patients with liver cirrhosis and gastric ulcer versus 0.7 ± 0.2 µg/l in the controls ($p<0.001$). The level was 0.7 ± 0.3 µg/l in the patients with fatty liver; i.e., it showed no significant difference from controls. The normal liver acts as a filter of plasma histamine, preventing unwanted effects on the systemic circulation. In liver cirrhosis, the elimination of plasma histamine is decreased, suggesting an etiological role of histamine in the genesis of gastric ulcer.

5131 DIAGNOSIS OF NONSUPPURATIVE CHRONIC DESTRUCTIVE CHOLANGITIS (PRIMARY BILIARY CIRRHOSIS). (Ger.) Brunner, G. (Medizinische Universitatsklinik, Humboldtallee 1, 3400 Gottingen, W. Germany). *Dtsch. Med. Wochenschr.* 101(36):1323-1324; 1976.

5132 THERAPY OF NONSUPPURATIVE CHRONIC DESTRUCTIVE CHOLANGITIS (PRIMARY BILIARY CIRRHOSIS). (Ger.) Brunner, G. (Medizinische Universitatsklinik, Humboldtallee 1, 3400 Gottingen, W. Germany). *Dtsch. Med. Wochenschr.* 101(36):1325-1326; 1976.

5133 EFFECT OF PORTACAVAL ANASTOMOSIS ON THE BILE ACID CONCENTRATION IN THE SERUM IN CIRRHOSIS. (Fre.) Poupon, R.; Poupon, R.; Grosdemouge, M. L.; Erlinger, S. (INSERM, Hopital Beaujon, 92110 Clichy, France). *Gastroenterol. Clin. Biol.* 1(4):402; 1977.

5134 TREATMENT OF ENCEPHALOPATHY FOLLOWING PORTAL SHUNT BY SECONDARY ARTERIALIZATION OF THE LIVER IN A CIRRHOTIC PATIENT [Abstract]. (Fre.) Grange, D.; Bismuth, H. (Hopital Paul-Brouss 14, avenue Paul-Vaillant-Couturier, 94800 Villejuif, France). *Gastroenterol. Clin. Biol.* 1(4):402-403; 1977.

5135 LIVER CIRRHOSIS AND HYPERESTROGENISM. (Ger.) Kley, H. K.; Wiegelmann, W.; Nieschlag, E.; Kruskemper, H. L. (2. Medizinische Universitatsklinik und -poliklinik, Moorenstr. 5, 4000 Dusseldorf 1, W. Germany). *Dtsch. Med. Wochenschr.* 101(35):1295-1298; 1976.

5136 SYMPOSIUM ON LIVER CIRRHOSIS WITH PORTAL HYPERTENSION. (Fre.) Weber, I.; Fabre, J. (Departement de medecine, Universite de Geneve, Geneva, Switzerland). *Rev. Fr. Gastroenterol.* (123):11-14; 1976.

See also, 4778, 4781, 4809, 5005, 5022, 5026, 5075, 5081, 5088, 5100, 5101.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5137 EXTRINSIC ABNORMALITIES AFFECTING THE BILIARY SYSTEM. (Eng.) Ochsner, S. F. (Ochsner Medical Institutions, 1516 Jefferson Highway, New Orleans, LA 70121). *Sem. Roentgenol.* 11 (4):283-287; 1977.

The occurrence of lesions extrinsic to the biliary system causing displacement of its segments is reviewed, and several illustrative cases are discussed. The radiologic pictures of upward displacement of the gallbladder occurring in a woman with a rounded mass filling the right upper abdomen (a renal cyst with renal cell carcinoma) and in a child with a hamartomatous hepatic cyst are presented. Downward displacement of the gallbladder in relation to the biliary ducts is generally the result of a liver neoplasm; as the mass enlarges, it bulges the inferior border of the liver downward. The case of a patient with a right-sided hepatic cyst that displaced the gallbladder downward and also compressed the right biliary ducts is described. A small localized tumor of the liver was demonstrated by a sharp displacement of a small intrahepatic duct. In another case, a huge hepatic hemangioma displaced the biliary tree of the right lobe; the tumor also displaced the common hepatic duct over into the left side of the abdomen and displaced all bile ducts upward. Localized common bile duct displacement is rare, because an enlarging benign process tends to displace a long segment of the duct rather than a short portion of it. However, such displacement is illustrated. Lateral displacement of the common duct is rare, and a case of this type associated with an inflammatory mass due to a surgical sponge is presented. Three examples of medial displacement of the common duct are presented, two of which were due to neoplasms and one of which was caused by a large pancreatic abscess.

5138 GALLBLADDER DISEASE AS A SIDE EFFECT OF DRUGS INFLUENCING LIPID METABOLISM: EXPERIENCE IN THE CORONARY DRUG PROJECT. (Eng.) Gordon, R. S.; Forman, S.; Canner, P.; Berge, K.; Miller, D. (Coronary Drug Project Coordinating Center, Univ. Maryland Sch. Medicine, 600 Wyndhurst Ave., Baltimore, MD 21210). *N. Engl. J. Med.* 296(21): 1185-1190; 1977.

Data obtained during a coronary drug project were analyzed to discover a possible relationship between the treatment of male patients with drugs influencing lipid metabolism and the development of subsequent gallbladder disease. Of 2,680 placebo-treated men who had had myocardial infarction, gallbladder disease developed in 69. In comparison, the frequency of gallbladder disease (cholecystitis or cholelithiasis) among 1,061 men receiving 2.5 mg estrogen, 1,081 men receiving 5.0 mg estrogen, 1,051 men receiving 1.8 g clofibrate, 1,057 men receiving 6.0 mg dextrothyroxine, and 1,069 men receiving 3.0 g nicotinic acid on a daily basis were 46, 47, 42, 23, and 35, resp. The differences in gallbladder disease occurrence between the placebo-treated patients and those treated with either estrogens or clofibrate were statistically significant at the 5% level. A total of 45 variables, including age, body weight, blood pressure, serum lipids, and blood sugar, were evaluated as risk factors among these patient groups. Age significantly correlated with prevalence of known gallbladder disease at entry ($r=0.066$, $p<0.001$). However, no variable yielded a strong and consistent correlation with the incidence of subsequent new gallbladder disease. Gallstone formation is concluded to be a risk whenever clofibrate or estrogens are prescribed.

5139 EFFECT OF INTRAVENOUS FAT EMULSION ON HEPATIC BILE. (Eng.) van der Linden, W.; Nakayama, F. (Dept. Surgery, Centrallasarettet, Ostersund, Sweden). *Acta Chir. Scand.* 142(5):401-406; 1976.

Hepatic bile from 16 patients with nonfunctioning gallbladders who were treated with an i.v. infusion of fat emulsion (20 g glycerol/100 ml) during prolonged preoperative fast was compared with bile from controls. After the infusion of the fat emulsion, rhomboid euhedral tetragonal cholesterol crystals were present in six of eight patients while they were absent in patients treated preoperatively with physiological saline ($p=0.04$). Polygonal crystals (5-30 nm diameter), which showed maltese crosses in polarized light, were also seen in five of eight patients treated with fat emulsion, whereas none were found in controls ($p=0.03$). Hepatic bile from the patients with non-functioning gallbladders treated preoperatively with fat emulsion infusion was found to have a higher mean lithogenic index (0.09 ± 0.12) than that of controls (0.75 ± 0.07). In cholecystectomized patients (8) no euhedral cholesterol crystals were found; however, sporadic presence of polygonal crystals was reported in four patients. It is concluded that infusion of fat resulted in increased lithogenicity of bile in all patients.

5140 BILIARY EXCRETION AND CONCENTRATION OF CEFAZOLIN. (Eng.) Ram, M. D.; Watanatittan, S. (Huron Road Hosp., 13951 Terrace Rd., Cleveland, OH 44112). *Am. J. Gastroenterol.* 66(6):540-545; 1976.

Biliary cefazolin excretion was investigated in 11 patients with cholelithiasis and/or cholecystitis and a radiologically visualized gallbladder, 9 patients with cholelithiasis and a radiologically nonvisualized gallbladder, 5 patients with obstructive jaundice, 5 patients with a T-tube in the common bile duct, and 4 controls. The controls, the patients with obstructive jaundice, and half of the patients with cholelithiasis received 2 g of cefazolin, i.m., in divided doses of 500 mg every 6 hr; the remaining patients received a single dose of 500 mg of the antibiotic i.m. After four injections, the mean cefazolin level in the gallbladder bile of the controls was 127.0 μg/ml. In the patients with cholelithiasis and cholecystitis and a visualized gallbladder, a similar high level was noted (132.0 μg/ml). In the presence of a nonvisualized gallbladder or obstructive jaundice, the cefazolin levels in the bile were lower (30.7 μg/ml in cholelithiasis/chronic cholecystitis with nonvisualized gallbladder). Two hours following a single injection of the drug, the level in the common duct bile reached a peak of 10 μg/ml and at 8 hr it fell to less than 1 μg/ml. In the absence of obstruction, cefazolin reaches a significantly high level in bile and could therefore be valuable in the treatment of biliary infections.

5141 SURGERY OF THE BILIARY TRACT IN GERIATRIC PATIENTS. PARTICULAR FEATURES, MANAGEMENT, RESULTS. (Ger.) Schima, E. (Chirurgische Abteilung, Krankenhaus, Liechtensteinstrasse 67, A-2130 Mistelbach, Austria). *Zentralbl. Chir.* 102(14):858-868; 1977.

Experience with and results of surgery on the gallbladder and bile ducts in 281 patients aged over 70 yr (average 76.1 yr) are presented. Surgery was performed for chronic cholelithiasis in 81 cases, acute cholecystitis in 121, and perforations in 26; operation was performed on the common bile duct in 80, and 15 patients were reoperated. The postoperative mortality was 2/81 in cases of chronic cholelithiasis, 28/185 in cholelithiasis with complications, and 2/15 reoperations. The findings indicate that cholecystectomy for chronic cholelithiasis should be performed even in old age. Acute inflammatory cholecystitis calls for immediate operation. Cholecystectomy is the method of choice, and cholecystostomy is done only in exceptional cases. If there are stones in the common bile duct or stenosis of Oddi's sphincter, acute or perforated cholecystitis is not an impediment to one-stage repair. The indications of transduodenal sphincterotomy are principally the same for all age groups; the postoperative mortality is not higher than that after operations on the common bile duct. The reoperative mortality rate for overlooked stones in the common bile duct or sclerosis of Oddi's sphincter is not higher than that after primary intervention for these conditions.

5142 PROBLEMS OF ATRETIC HEPATOPATHY. PART 2. THERAPEUTIC PROBLEMS. (Spa.) Gubern Salisachs, L. (Instituto Corachan, Barcelona, Spain). *Rev. Esp. Pediatr.* 31(184):613-636; 1975.

The problems of diagnosis and treatment of biliary atresia in infants are reviewed, with emphasis on the work of Japanese clinicians. Early differentiation of neonatal hepatitis and biliary atresia is crucial to subsequent prognosis. Infants with hepatitis should not be treated surgically, while those with extrahepatic atresia must be treated surgically between 4 and 6 weeks of age before the onset of cirrhosis. The relative diagnostic values of standard techniques, such as scintigraphy, cholangiography, elimination of rose bengal with simultaneous cholestyramine administration, laparotomy, and puncture biopsy, are assessed. In spite of the danger of surgical intervention to infants with hepatitis, surgery is recommended if any sign of atresia appears before 3 months of age, as the danger of untreated atresia is greater than the danger of surgery. Surgical techniques (including hepatoportal enterostomy) are described and illustrated, and palliative measures are discussed for incurable cases.

5143 FACTORS AFFECTING BILIRUBIN EXCRETION IN PATIENTS WITH CHOLESTEROL OR PIGMENT GALLSTONES. (Eng.) Shull, S. D.; Wagner, C. I.; Trotman, B. W.; Soloway, R. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 72(4):625-629; 1977.

To identify factors affecting bilirubin excretion, the effects of bile flow and bile salt excretion on bilirubin output into bile were examined in eight patients with cholesterol (CS) and two patients with pigment (PS) gallstones. All patients were normobilirubinemic and cholecystectomized with balloon-occludable, reinfusion T-tubes. Another patient with PS, sickle cell disease (SS), and stable jaundice was studied to examine the mechanism by which an increased bilirubin load was excreted. Total bilirubin was almost entirely conjugated, and excretion was related linearly to bile salt excretion in PS and CS patients; one-third of bilirubin excretion was bile salt-independent and two-thirds were bile salt-associated. In the SS patient, 90% of the bilirubin excretion was independent of bile salt output. In PS and CS patients, bilirubin output was linearly related to bile flow, but the SS patient showed significant bilirubin excretion at low flow rates. CS and PS patients had similar patterns of bilirubin excretion, but the increased bilirubin load in the SS patient was excreted entirely independently of bile salts. In the SS patient, unconjugated bilirubin output was hyperbolically related to bile salt output and represented a maximum of 3% of the total bilirubin output. The bile salt-independent excretion of conjugated bilirubin suggests that micelles were not required for transport into bile, whereas the hyperbolic relation for unconjugated bilirubin and bile salt output (similar to that of the micellar lipids, cholesterol, and phospholipids) suggests interaction with micelles.

5144 THE USE OF d-LIMONENE PREPARATION AS A DISSOLVING AGENT OF GALLSTONES. (Eng.) Igim H.; Hisatsugu, T.; Nishimura, M. (First Dept. Surger Faculty Medicine, Fukuoka Univ., Fukuoka, Japan). *Am. J. Dig. Dis.* 21(11):926-939; 1976.

The value of a *d*-limonene preparation for gallstone dissolution was tested in *in vitro* and *in situ* solubility studies, and clinical studies were undertaken after toxicity, pharmacodynamic, and metabolic studies confirmed its safety. *In vitro*, a mixture of 97.0 parts *d*-limonene, 2.1 parts polysorbate 80, and 0.9 parts sorbitan mono-oleate completely dissolved a pure cholesterol stone within 2 hr, two cholesterol-pigment-calcium stones in 2 hr (by 85.4% and 90.1%, resp.), a bile pigment-calcium stone in less than 150 hr (16.8%), and a fatty acid-calcium stone in about 6 hr (25.2%). Five healthy volunteer received *d*-limonene (20 g) p.o., and the following examinations were undertaken: liver function (total protein, A/G, TTT, ZTT, total bilirubin, total cholesterol, SGOT, SGPT, and alkaline phosphatase), urinalysis, kidney function (blood urea nitrogen), and pancreatic function (amylase). None were abnorm except that minor proteinuria was seen transiently in each patient. All volunteers complained of mild diarrhea and tenesmus. The preparation was tested in 15 patients whose surgically removed stones had dissolved *in vitro* with this procedure; all patients were subsequently found to have retained stones in the common or hepatic duct after surgery. Three weeks postoperatively, the choledochal drain was removed and replaced immediately by a rubber cathete chemically resistant to *d*-limonene. The end of the tube was directed to the stones using a guidewire. Twenty milliliters of *d*-limonene was injected for a period of 30 min or longer, and the drain was clampe for 0.5-2 hr to keep the preparation in contact with the stones; this procedure was usually carried out every other day. In 14 cases, 3 of which are presented in detail, the third to 25th infusion was effective in dissolving retained stones. The stones in all these patients contained 70% or more cholesterol. In one of the successful cases, the dissolving effect of the preparation was clearly evident; four stones in the common bile duct were dissolved first, and the stone lodged in the duodena papilla disappeared finally. This procedure may be carried out as an adjunct of the mechanical lithotom or as a unique technique when the mechanical method may not be suitable.

45 DISSOLUTION OF RETAINED CHOLEDOCHAL
CALCULI. (Eng.) Wheeler, M. H. (Univ.
sp. Wales, Cardiff, Wales). *Ann. R. Coll. Surg.*
gl. 59(2):153-157; 1977.

e history of the technique of promoting dissolu-
on of retained gallstones in the biliary tree is
iefly reviewed, and experience with six patients
th retained choledochal calculi is presented.
ese patients were treated by common duct infusion
heparinized saline and/or sodium cholate for
-28 days. Successful gallstone dissolution was
hieved in five patients, one of whom developed
evere pancreatitis and renal failure responsive
peritoneal dialysis. Other complications in
ese patients included diarrhea and vomiting.
e one failure was in a patient whose retained
tone was situated in the left hepatic duct. This
ethod is a valuable alternative to re-exploration
f the common bile duct, particularly when calculi
re situated in the distal part of the duct.

146 CHOLEDOCHAL CYST IN INFANCY AND CHILDHOOD:
ANALYSIS OF 16 CASES. (Eng.) Kobayashi,
.; Ohbe, Y. (Natl. Children's Hosp., Taishido 3-35-
1, Setagaya-ku, 154 Tokyo, Japan). *Arch. Dis.*
hild. 52(2):121-128; 1977.

he clinical features of 16 infants and children
ith choledochal cysts are described, and the case
eports of seven patients are presented. Choledo-
hal cyst was diagnosed before operation in 14 out
f 16 patients by means of a combination of diag-
ostic tests. Ultrasonic echogram showed a cystic
ass in all 11 patients examined. The character-
stic displacement of the duodenum was noted in 9
f 14 patients by contrast studies of the upper
astrointestinal tract, and hepatobiliary scinti-
canning confirmed choledochal cyst in 7 of 8 pa-
ients. A cyst was shown by p.o. or i.v. cholangio-
raphy in three of four patients. In 16 patients, the
nset of symptoms occurred from 7 days of age to 9.5
r; in 10 patients onset occurred under 12 months of
ge, in 3, from 13 to 24 months, and in the remaining
, from 2 to 9.5 yr. The first symptoms were jaun-
ice, vomiting, acholic stools, and poor sucking.
bstructive jaundice and acholic stools were found
in over 80% of the patients, and abdominal mass in
60%. Vomiting occurred in 50% of the patients,
one-third of whom showed failure to thrive, and
70% of patients over the age of 1.5 yr had abdom-
inal pain. About half of the patients had a mild
to moderate degree of fever. In all patients,
primary excision of the cyst was followed by hep-
aticojejunostomy in Roux-en-Y fashion. The post-
operative course was uneventful in 14 patients;
2 patients died, one from ascending cholangitis and
one from hepatic failure. When choledochal cyst
is suspected, the following diagnostic procedures
are necessary to confirm the diagnosis, in this
order: ultrasonic echography, roentgenological
studies of the upper gastrointestinal tract, and
hepatobiliary scintiscanning.

5147 BACTERIOLOGICAL STUDY OF BILE IN CHOLELITHIASIS (REPORT OF 177 CASES). (Fre.) Grimoud, M.; Izard, G.; Lazorthes, F.; Lemozy, J. (No affiliation given). *Bull. Acad. Natl. Med. (Paris)* 160(2):203-207; 1976.

A bacteriological study of preoperative bile samples from 177 patients with cholelithiasis revealed positive cultures in 105. Gram-negative bacteria was the most frequently encountered group of flora: *Escherichia coli* (48), *Klebsiella pneumoniae* (29), *Proteus* (6), group B *Salmonella* (wien) (1), *Pseudomonas aeruginosa* and other bacteria (8), and *Acinetobacter calcoaceticus* (3). Other organisms found included *Streptococcus faecalis* (7), *Staphylococcus aureus* (2), and *Candida tropicalis* (1). External drainage (Kehr procedure) was the cause of infection in 14 cases, and the frequency of positive cultures paralleled the age of the patients. Findings were positive in 50% of the patients aged <70 yr and in 73-90% of patients aged 70-80 yr. A relation between bile infection and postoperative morbidity was also noted: 53/105 patients developed parietal or deep abscess, septicemia, bronchial or urinary tract infection, or isolated hyperthermia, compared with only 12/72 patients with negative cultures. The highest incidence of positive cultures also occurred in patients with acute cholecystitis (62%) and bile duct lithiasis (64%); cultures of 47% of the patients with chronic cholecystitis were positive. It was concluded that even exploratory choledochotomy would triple the incidence of postoperative morbidity. Proper antibiotic therapy should be instituted prior to exploratory procedures.

5148 BILIRUBIN URIDINE DIPHOSPHATE-GLUCURONOSYLTRANSFERASE DEFICIT IN THE LIVER AND CHOLELITHIASIS. (Fre.) Duvaldestin, P.; Metreau, J. M.; Preaux, A. M.; Merthelot, P. (INSERM U-99, Hopital Henri-Mondor, F 94010 Creteil, France). *Biol. Gastroenterol. (Paris)* 9:338; 1976.

The relation between the occurrence of certain bladder calculi and bilirubin uridine diphosphate-glucuronosyltransferase (BUDP-GT) levels was investigated in 37 adults with biliary lithiasis (BL) and in 33 control subjects. BUDP-GT levels were low (<0.600 mg conjugated bilirubin/hr/g liver) in 13/37 patients (7/10 men and 6/27 women), but in only 1/33 controls. Pathological BUDP-GT levels occurred more frequently in the younger patients (9/16 of those <50 yr of age). The distribution of age and sex differs in cholesterolic lithiasis. There may be a relation between BUDP-GT deficiency and the presence of certain biliary calculi.

5149 RESULTS OF THE TREATMENT OF CHOLELITHIASIS AND ITS CONSEQUENCES: THE SO-CALLED "POST-CHOLECYSTECTONY SYNDROME". (Ger.) Kothe, W.; Mlynek, H. J.; Schenker, U. (Chirurgische Klinik des Bereichs Medizin, Karl-Marx-Universitat, Liebigstrasse 20a, DDR-701 Leipzig, E. Germany). *Zentralbl. Chir.* 101(18):1125-1135; 1976.

Surgical results in patients with gallbladder and bile duct diseases are presented. A group of 146 patients underwent cholecystectomy for cholelithiasis (group 1), 122 underwent choledochotomy for choledocholithiasis (group 2), and 110 underwent sphincterotomy for papillary stenosis (group 3). The cure rate was 81% in group 1, 69% in group 2, and 75% in group 3. There was considerable improvement in 15% of group 1, 22% of group 2, and 17% of group 3 patients; these patients did not have serious complaints and they were able to work. Slight improvement was achieved in 4% of group 1, 9% of group 2, and 8% of group 3 patients. The major complications and complaints among the patients showing moderate to slight improvement included hypochlorhydria, hyperchlorhydria, biliary dyskinesia, and cholangiohepatitis, along with atrophic gastritis, hiatal hernia, gastric ulcer, duodenal ulcer, duodenal diverticulum, liver cirrhosis, fatty liver, chronic pancreatitis, adhesions, and postoperative hernia. The incidence and intensity of the postoperative complications increased with the length and seriousness of the primary disease. Postoperative mortality was 0.95% due to cholelithiasis, 14% due to choledocholithiasis, 11.1% due to papillary stenosis, 14.6% due to choledigestive fistula, 22.2% due to perforating cholecystitis, 36% due to gallstone ileus, 8% due to lesion of the common bile duct, and 10.7% due to complications after reoperation. The findings indicate the necessity of early surgical treatment of cholelithiasis and of the exact preoperative diagnosis of other abdominal organs.

5150 THE POSTCHOLECYSTECTOMY SYNDROME. PROPHYLAXIS AND THERAPY. (Ger.) Grill, W. (Chirurgische Abteilung des Kreiskrankenhauses, Osswaldstr. 1, D-8130 Starnberg, W. Germany). *Munch. Med. Wochenschr.* 119(17):569-572; 1977.

The problems, prophylaxis, and treatment of postcholecystectomy syndrome, based on 2,890 procedures performed over an 11-yr period, are presented. Overall, 360 multiple procedures were performed for unrecognized bile duct stones and papillary stenoses, which indicated that the bile duct disorders were not confined to the gallbladder, but had spread to the drainage bile ducts. The primary prophylaxis for postcholecystectomy syndrome is early surgery to stop the disease spreading to the drainage bile ducts, papilla, and pancreas. Discrete epigastric pain was frequent, which is not indicative of gallstone disease; one-fifth of the operated patients 60 yr and above had been treated for gastritis. Intraoperative radiomanometry (determination of pressure and x-ray picture of the bile ducts) is recommended prior to surgery. Leftover cystic stumps with neuromas, remainders of gallbladder, and concrements also required repeat surgery. In these instances, endoscopic retrograde cholangiography was decisive, but the detection of papillary stenoses can also be problematic with this procedure, and transduodenal sphincterotomy is indicated. Surgical reintervention was performed in 43 patients because of falsely indicated choledochoduodenostomy and subsequent cholangiophytiasis. Villous polyps or carcinoma of the bile duct were also found. In the former cases, local excision was performed, whereas a duodenohemipancreatectomy (Whipple's operation) was carried out for carcinoma of the papilla. Cystojejunostomies were done in patients with pseudocysts of the head of the pancreas. Cholangio- and pancreaticography was indicated in patients wit severe chronic pancreatitis, followed by a distal hemipancreatectomy and opening of the pancreatic duct. Hydatid cysts of the liver were totally excised on several occasions.

5151 REOPERATION OF THE BILE DUCTS. (Ger.) Sery, Z.; Duda, M.; Kral, V.; Manak, P. (I. Chirurgische Universitatsklinik, I. P. Pavlova 6, Olomouc, Czechoslovakia). *Zentralbl. Chir.* 102 (14):851-857; 1977.

The causes and results of bile duct reoperation among a total of 5,560 primary interventions (performed from 1951 to 1975) are reviewed. Reoperatio was necessary shortly after papillosphincterotomy in 21/654 patients because of inflammation (17, 4 of whom died postoperatively) and gastrointestina hemorrhage (4, all of whom survived). Another 24 patients had to be reoperated within 7 yr as a result of choledocholithiasis in 11 patients, stenosi of the ampulla of Vater in 6, and other causes in 7 The 11 choledocholithiasis patients underwent resphincterotomy with stone extraction (8), stone extraction by choledochotomy (1), and stone extractio with choledochojejunal anastomosis (2). The six recurrent stenosis patients underwent resphincterotomy (3), or choledochoduodenal anastomosis (3). A total of 84 reoperations were performed on 35 patients for iatrogenic stricture of the bile ducts surgery consisted of choledochoduodenojejunal anastomosis in 6 patients (8 operations, mortality 0/6) hepaticoduodenal anastomosis in 9 (17 operations, mortality 1/9), hepaticojejunal anastomosis in 10 (27 operations, mortality 1/10), diahepatic drainage according to Smith in 8 (28 interventions, mortality 0/8), and various interventions in 2 (4 interventions, mortality 0/2).

5152 PORCELAIN GALLBLADDER (CHOLECYSTOPATHY WITH LIMY BILE). (Spa.) Cuartero, A. R. Garcia, M. M. (Facultad de Medicina, Hospital Clin ico de "San Cecilio," Universidad de Granada, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(3): 387-392; 1976.

Cholecystopathy with limy bile was discovered in a 48-yr-old man who presented with gastric dyspepsia without history of hepatobiliary dysfunction. This disorder can only be diagnosed by simple radiograph and it is often found accidentally in the course of gastric exploration. Without contrast medium, the calcium-rich gallbladder produces a radiopaque shadow with transparent zones (cholesterol calculi) Treatment is usually surgical. In reported cases, 86.5/100 are women and 13.5/100 are men. Etiology, clinical signs, and occurrence of this rare disorde are briefly reviewed.

5153 LATE STENOSIS OF THE INTERMEDIATE COMMON BILE DUCT. (Spa.) Bergalli, L. E.; Piacenza, G.; Chifflet, J.; Gateno, N.; Estefan,

A.; Priario, J. C.; Praderi, R. C. (Republica Dominicana 2922, Montevideo, Spain). *Cir. Uruguay* 45(3):189-191; 1975.

Three cases are presented in which stenosis of the intermediate common bile duct occurred several years after biliary tract surgery. Two patients had undergone cholecystectomy for biliary lithiasis, and the other had undergone choledochotomy for removal of a 3-cm calculus. The patients presented with several episodes of jaundice 5-12 yr later, sometimes accompanied by fever, acute abdomen, acholia, or choluria. These symptoms prompted erroneous diagnoses of hepatitis, residual choledochal lithiasis, and neoplasm of the pancreas. Surgery revealed non-neoplastic fibrosclerotic strictures of the bile duct in all three cases. Choledochal resection was repaired by end-to-side hepatojejunal anastomosis or by reconstruction of the biliary duct, in each case reinforced by a tube. Good recovery was reported in two of three patients.

5154 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY (ERCP). (Ger.) Koch, H.; Schneider, A.; Rosch, W.; Schaffner, O. (Medizinische Univ.-Klinik, 852 Erlangen, W. Germany). *Aktuel. Chir.* 12(2):91-102; 1977.

Endoscopic retrograde cholangiopancreaticography (ERCP) was performed in 2,595 patients for suspected pancreatic disease (550 patients), common bile duct disease (833), pancreatic and common bile duct disease (119), and subjective abdominal complaints (1,093). The diagnostic results were chronic pancreatitis in 55 patients, pancreatic carcinoma in 104, calculi in the biliary tract in 731, and normal findings in 1,100. The success rate of ERCP was 83.9% in the pancreatic duct and 74.1% in the biliary tract. Thirty-four patients developed acute pancreatitis following ERCP, 8 of whom had preexisting disease of the pancreas and 22 had preexisting disease of the bile ducts. The pancreatitis was fatal in five patients: an infected pseudocyst was the cause of death in one, total pancreatic necrosis in the others. ERCP should be the last diagnostic procedure employed to clarify surgical indications. Early ERCP is indicated in biliary tract diseases.

5155 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN DIAGNOSTIC EVALUATION OF 160 JAUNDICED PATIENTS. RESULTS OF AN IMPROVED TECHNIC. (Eng.) Burcharth, F.; Christiansen, L.; Efsen, F.; Nielbo, N.; Stage, P. (Herlev Hosp., Univ. Copenhagen, 2730 Herlev, Copenhagen, Denmark). *Am. J. Surg.* 133(5):559-561; 1977.

Percutaneous transhepatic cholangiography (PTC) was carried out in 160 patients using an improved technique. Selective catheterization is employed, with introduction of the catheter in the right midaxillary line at the level of the 12th thoracic vertebra. In patients with biliary obstruction, the catheter is left indwelling centrally in the biliary passages for external bile drainage; thus, the investigation does not necessitate immediate operation in these patients. The biliary tree was visualized in 139 patients, and the biliary tree and the obstruction were disclosed by PTC in 113 of the 115 patients with surgically or autopsy proven obstruction. Suspicion of obstruction was ruled out in 45 patients; normal bile ducts were demonstrated in 26 of these, and the biliary tree could not be visualized in 19 patients. Complications occurred in six patients, but these were not exclusively due to PTC; they included bile leakage, hepatoduodenal ligament edema, and intra-abdominal bleeding (due to tearing out the catheter in mentally confused patients). PTC may be useful in the differential diagnosis between obstructive and nonobstructive jaundice, and laparotomy can be frequently avoided.

5156 ULTRASONIC INVESTIGATIONS IN OBSTRUCTIVE BILIARY TRACT DISEASES. (Ger.) Frommhold, H.; Koischwitz, D. (Radiologische Universitatsklinik, 5300 Bonn 1, Venusberg, W. Germany). *Dtsch. Med. Wochenschr.* 102(2):62-63; 1977.

Ultrasonic echography is particularly useful when x-ray studies cannot be carried out, as in severe damage of the liver parenchyma, hyperbilirubinemia, and obstructive dilatation of the gallbladder. Knowledge of normal sonotomography is necessary to diagnose any pathological changes. The locations of the aorta, vena cava, and portal vein serve as reference points. The gallbladder is recognized as a cystic structure with a homogeneous, echo-free space and sharply defined border echoes within the liver parenchyma. Echographic diagnosis of gallbladder hydrops, based on the clear difference in impedance between the gallbladder wall and the increased gallbladder contents, is usually made easily. Longitudinal and transverse sections must be combined for gallstones to be demonstrated. The reflection of the gallbladder must be differentiated from that of an echinococcus cyst, liquefied hematoma, or liver abscess. Echographic diagnosis of the extended intra- and extrahepatic bile discharge pathway is more difficult, requiring systematic transverse sections of the liver between the xiphoid and the navel, with 20- to 25-mm sections, which are usually differentiated by exact analysis of the ribbonlike contours of the intrahepatic portal vein branches. In obstructive diseases of the pancreas, attention must be paid to the biliary system.

5157 ULTRASONOGRAPHY IN OBSTRUCTIVE JAUNDICE. (Eng.) Malini, S.; Sabel, J. (Texas Medical Center, Houston, TX 77030). *Radiology* 123 (2):429-433; 1977.

The accuracy of ultrasonic examination in differentiating obstructive jaundice from nonobstructive jaundice and in delineating the site of obstruction was evaluated in 35 patients. The diagnosis was substantiated by laparotomy, autopsy, or liver biopsy. Eighty-six percent of the 35 jaundiced patients were correctly identified as having either obstructive or hepatocellular jaundice. There were three false negative and two false positive examinations. The site of obstruction was accurately identified in 85% of the patients as being (a) at the level of the proximal bile duct or porta hepatis, or (b) at the level of the distal bile duct or pancreas. The criteria for the diagnosis of obstructed bile ducts were the finding of an enlarged common bile duct above 1 cm in diameter, or the presence of multiple intrahepatic bile ducts measuring 4 mm and above. Radionuclide imaging of the liver was carried out in 30 cases; the image was normal in 1 case. Obstructive jaundice was noted in 22 patients; 8 of these, who were reported to have an enlarged porta hepatis, were found to have surgical obstruction. In the remaining 14 patients, diffuse patchy uptake was reported in 12 examinations. Abdominal ultrasound is useful in the evaluation of jaundice and the diagnosis of obstruction, and it is recommended as a preliminary study in the evaluation of jaundice.

5158 LIPOPROTEIN X (LP-X) IN THE DIAGNOSIS OF THE CHOLESTASIS SYNDROME. AN OVERVIEW OF CURRENT METHODS OF DETECTION AND DETERMINATION AS WELL AS CLINICAL IMPORTANCE. (Ger.) Kerber, Ch.; Ehrke, D.; Storm, H.; Linneke, P. (Abteilung fur Gastroenterologie und Hamatologie der Medizinischen Klinik des Bezirkskrankenhaus, Wismarsche Strasse 298, DDR-27 Schwerin, E. Germany). *Dtsch. Gesundheitsw.* 31(45):2153-2157; 1976.

Studies of the detection, determination, and diagnostic value of lipoprotein X (LP-X) in the cholestasis syndrome are reviewed. LP-X can be detected by ultracentrifugation, gel precipitation, or by a more complicated method with monospecific antiserum to LP-X. Quantitative determination is possible by determination of free cholesterol or phospholipids in the LP-X fraction on the basis of the constant composition of LP-X, by electroimmunodiffusion, radical immunodiffusion, or by direct densitometry following precipitation and electrophoretic separation. LP-X is the most reliable of all biochemical parameters available for the diagnosis of cholestasis. However, it does not permit differential diagnosis between the intrahepatic and extrahepatic forms. There is no correlation between positive LP-X test and the presence of hepatitis B antigen. Serum LP-X is sharply reduced or it disappears following heparin injection *in vivo*.

5159 ABNORMAL LIPOPROTEIN (LP-X) IN THE FIRST MONTHS OF LIFE WITH PARTICULAR REFERENCE TO OBSTRUCTIVE JAUNDICE. (Ger.) Lachmann, D. (Universitats-Kinderklinik, Wahringer Gurtel 74-76, A-1090, Vienna, Austria). *Wien. Klin. Wochenschr.* 89(Suppl. 69):1-28; 1977.

Lipoprotein (LP) levels were measured in over 2,000 sera from more than 370 premature and mature newborns to detect obstructive jaundice. Quantitative, qualitative and semiquantitative (Rapidophor method)
measurements of LP were made; cholesterol, trigly
cerides, bilirubin, and serum enzyme activities
(SGGT, alkaline phosphatase) were also measured.
A study of 270 of the infants, aged up to 16 week
showed that 268 had abnormal LP levels. Of 80 co
trols, aged 4-12 months, abnormal LP levels were
detected in 8. Fifty-four percent of the abnorma
LP levels were found in infants 1-7 days old, whe
as this increased to 86% for infants 2 weeks old.
No correlation was found between alkaline phospha
tase, SGGT, bilirubin, and abnormal LP levels. T
frequency of abnormal LP levels was greatest in i
fants with liver diseases (85%), followed by earl
birth (83%), diabetic fetopathies (80%), blood
group incompatibility (73%), hyperbilirubinemia
(75%), pulmonary diseases (76%), cardiac valve de
fects (72%), birth trauma (70%), small sized babi
(67%), malformations (65%), mucoviscidosis (57%),
neurological diseases (56%), and gastrointestinal
diseases (36%). No abnormal LP levels were found
in 30 healthy pregnant women or in cord blood at
the time of birth. The LP levels did not depend
on the type of nourishment taken. Babies weighin
less than 1,500 g had markedly higher LP levels
than those between 1,500 and 2,500 g and fullterm
infants. LP levels returned to normal after 7 we
of age. In six infants with proven obstructive
jaundice, the LP levels during the acute stage
ranged from 56 to 112 mg/100 ml, and in one infan
it increased to 900 mg/100 ml. The bilirubin lev
ranged from 5.6 to 19.7 mg/100 ml. Four of the s
infants survived, and LP levels returned to norma
during the 5-10th week. The causes of obstructiv
jaundice included cholestasis with intrahepatic b
duct hyperplasia, premature birth, giant cell hep
titis, hepatitis with sepsis, and extrahepatic
atresia. It is suggested that high LP levels may
be due to a cholestatic type of mechanism, a defi
ciency in the cholesterol-acetyltransferase syste
or an insufficient supply of lipoprotein lipase,
which catalyzes LP.

5160 COMPRESSION OF THE RETROPANCREATIC BILE
DUCT BY A MASS OF TUBERCULOUS LYMPH NOD
CAUSING OBSTRUCTIVE JAUNDICE. (Fre.) Martinon,
Aurousseau, R. (Hopital Laennec, 42, rue de Sevre
75 Paris, France). *J. Chir. (Paris)* 112(3):145-
152; 1976.

Tuberculosis of the retroduodenopancreatic lymph
nodes was found in a 28-yr-old African man with n
previous medical history. The enlarged nodes com
pressed the retropancreatic bile duct, causing a
severe obstructive icterus. Since this rare type
of tuberculosis is almost always a primary infec-
tion, the correct diagnosis is difficult and usu-
ally only becomes apparent during exploratory sur
gery. A simple biliary bypass was performed, sin
the removal of the tuberculous nodes carried a
high risk. Antitubercular drugs were administere
for 18 months postoperatively, and a total cure w
achieved.

5161 POSTOPERATIVE JAUNDICE. REPORT OF 14
CASES. (Fre.) de Blonay, J. (Departeme

Chirurgie, Hopital Cantonal universitaire de
eve, Clinique chirurgicale universitaire, 1211
eva 4, Switzerland). *Sem. Hop. Paris* 53(3):
-189; 1977.

toperative jaundice (PJ) developed in 14/1,027
ients following surgical intervention for hepatic,
iary, pancreatic, and gastrointestinal diseases.
time of appearance of PJ ranged from 2 to 11
s postsurgery, and the mean duration was 11.6
s. Surgical, medical, and indirect factors were
sidered. The peritoneum was opened in all the
ients. Six of the patients had received halothane,
ch tripled the bilirubin level. Two patients
received multiple treatments, and PJ was
ributed solely to promethazine in one. Anoxia
have been a factor in three patients, along
h sepsis and fever. An excess of biliary pig-
t, viral and intercurrent serum hepatitis, and
enteral alimentation may also have been contri-
ory factors. Four of the 14 patients who
eloped PJ died: massive steatosis developed in
atient, another showed a histologically normal
er at autopsy, 1 had cholestasis of the liver,
no autopsy could be performed in the fourth.
10 remaining patients were cured.

52 CLINICALLY UNDIAGNOSED GLYCOGEN STORAGE DISEASE TYPE I AS A CAUSE OF POSTOPERATIVE
TH. (Ger.) Nier, H.; Sailer, R.; Muntefering,
(Chirurgische Klinik und Poliklinik der Univer-
at, Moorenstrasse 5, 4000 Dusseldorf 1, W. Ger-
y). *Dtsch. Med. Wochenschr.* 102(12):433-435;
7.

30-yr-old woman underwent cholecystectomy with a
tative diagnosis of complete obstruction of the
stic duct. The preoperative clinical and biochem-
l findings (serum electrolytes, RBC, WBC, bil-
ubin, alkaline phosphatases, serum transaminases,
diastase) were normal. Calculi were found in
gallbladder, but not in the cystic duct or in
her sections of the biliary tract. The patient
ddenly developed cardiac and respiratory arrest
out 3 hr after awakening from the anesthesia.
patient was revived, but she died of another
tack on the following morning. Blood serum taken
ring reanimation had a potassium level of 2.6 mmol/
1, an oxygen pressure of 34.8 mm Hg, and a pH of 6.96. Pronounced type I glycogen storage disease, with glycogen deposits in all liver cells and in the tubular epithelium of the kidneys, was found at autopsy. Hypoglycemia and metabolic acidosis were assumed to have led to hypokalemia, which was considered the cause of cardiac failure.

5163 THE SIGNIFICANCE OF THE NON-VISUALIZED GALLBLADDER AT TRANSHEPATIC CHOLANGIOGRAPHY (THC) [Abstract]. (Eng.) Johnson, G. H.; Halls, J.; Douglas, A. P. (Dept. Medicine, Univ. Southern California, Los Angeles, CA). *Clin. Res.* 25(2):110A; 1977.

5164 SOME PROBLEMS OF BILIARY TRACT SURGERY. (Eng.) Ong, G. B. (Dept. Surgery, Univ. Hong Kong, Hong Kong). *J. R. Coll. Surg. Edinb.* 22(1):9-18; 1977.

5165 CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT: RELATIONSHIP TO ANOMALOUS PANCREATICOBILIARY DUCTAL UNION. (Eng.) Kimura, K.; Ohto, M.; Ono, T.; Tsuchiya, Y.; Saisho, H.; Kawamura, K.; *et al.* (Chiba Univ. Sch. Medicine, Chiba [280], Japan). *Am. J. Roentgenol.* 128(4):571-577; 1977.

5166 THE MANAGEMENT OF GALLSTONE ILEUS. (Eng.) Mackenney, R. P. (Stoke Mandeville Hosp., Aylesbury, Bucks, England). *J. R. Coll. Surg. Edinb.* 21(5):292-295; 1976.

See also, 4651, 4670, 4750, 4752, 4771, 4775, 4785, 4786, 4832, 4883, 4915, 4986, 4989, 5002, 5004, 5024, 5026, 5035, 5045, 5047, 5053, 5054, 5071, 5081, 5190, 5212.

GENERAL

67 BEHCET DISEASE AND THE HLA SYSTEM. (Eng.) Takano, M.; Miyajima, T.; Kiuchi, M.;
mori, K.; Amemiya, H.; Yokoyama, T.; *et al.* (Dept.
rmatology, Chiba Univ., 1-8-1 Inohana, Chiba,
pan). *Tissue Antigens* 8(2):95-99; 1976.

microdroplet lymphocytotoxicity test was used to
issue type for 26 antigens of the HLA system in
3 unrelated patients with Behcet's syndrome and in
3 members of seven families with at least 2 patients
er family. Among 17 patients with complete type
isease, which included all four major clinical
manifestations (aphta, skin, genital, and occular lesions), 88.2% had HLA-B5 as compared with 38.3% for controls (corrected p=0.0052). For 37 patients with incomplete type disease (at least three of the above lesions or both ocular lesion and the other two clinical manifestations), 8 patients with probable disease (two lesions not including occular lesions), and 11 patients with possible disease (only aphta), the corrected p value was not significant, although B5 was more frequent in patients with incomplete disease than in controls. The incidence of HLA-B5 was more common in male

patients than in females, being 9/9, 6/9, 2/5, and 2/4 for complete, incomplete, probable, and possible type disease, resp., versus 6/8, 16/28, 0/3, and 2/7 for female patients with the above disease types, resp. The family studies showed that, in three families, all of the patients had haplotypes containing B5 that were common to the patients in the respective families. In three other families, the patients had particular haplotypes associated with disease type, although they did not have B5. In one of these three families, the incomplete type patients had a particular haplotype (9, BW40) that the possible type patients did not have; in another family, the probable type patients had a particular haplotype (AW30, 7) that the possible type patients did not have. In the seventh family, this particular haplotype did not exist in the incomplete type patients. The family studies suggest that the genes closely linked to the HLA locus influence the severity of Behcet disease.

5168 EXOCRINE PANCREATIC FUNCTION IN JUVENILE-ONSET DIABETES MELLITUS.

(Eng.) Frier, B. M.; Saunders, J. H. B.; Wormsley, K. G.; Bouchier, I. A. D. (Ninewells Hosp. Medical Sch., Univ. Dundee, Dundee, Scotland). *Gut* 17(9):685-691; 1976.

Exocrine pancreatic function was studied in juvenile-onset diabetics (20), maturity-onset diabetics (7), patients with diabetes secondary to chronic pancreatitis (5), and 13 nondiabetic controls to establish the frequency of exocrine pancreatic dysfunction and its relation to the degree of impairment and duration of the disease. The exocrine pancreatic secretory capacity was reported to be reduced in 80% of insulin-dependent diabetics, and the degree of dysfunction increased with the duration of the disease. The outputs of bicarbonate (all patients), trypsin (80% of patients), and amylase (65% of patients) were significantly reduced in diabetic patients in response to i.v. secretin (1 clinical U/kg/hr) and cholecystokinin-pancreozymin (1 Ivy U/kg/hr). The output of bicarbonate in patients with less than 10 yr of diabetes showed an inverse relation ($p < 0.0125$) with the total daily insulin dosage required for control of the disease. The extent of exocrine pancreatic secretory insufficiency was reported to be related to the duration of the disease in the juvenile-onset group. Five patients with chronic pancreatitis had severe steatorrhea, indicating destruction of about 90% of the exocrine secretory capacity. It is concluded that reduction in pancreatic secretory capacity is significant and must be taken into consideration when interpreting pancreatic exocrine function in diabetics.

5169 STOOL BACTERIAL AEROBIC OVERGROWTH IN THE SMALL INTESTINE OF CHILDREN WITH ACUTE DIARRHOEA.

(Eng.) Neto, U. F.; Toccalino, H.; Dujovney, F. ([U.F.N.] Rua Luiziana, 129-Casa 4, Brooklyn Paulista, Sao Paulo, Brazil). *Acta Paediatr. Scand.* 65(5):609-615; 1976.

The aerobic flora of 22 children (ages 40 days t
months) with malnutrition and acute diarrhea and
well-nourished children (ages 45 days to 9 months
with acute diarrhea were examined by intubation
the upper and middle small intestine and by stool
culture. In 18 of the 22 children with malnutrit
material for bacteriological study was obtained
the upper small intestine; growth was 10^4 bacter
(2 cases), 10^5/ml (2 cases), 10^6/ml (2 cases), a
10^7/ml (12 cases). Culture material obtained fr
the middle small intestine in 17 cases showed gr
of 10^5 bacteria/ml (3 cases), 10^6/ml (4 cases),
10^7/ml (10 cases). Enteropathogenous bacteria w
concomitantly observed in the small intestine an
in stool culture in six cases; they were isolate
exclusively in stool culture in two cases and ex
sively in the small intestine in one case. Samp
of the upper small intestine from three of five
nourished children showed growths of 10^3 bacteri
10^5/ml, and 10^7/ml, resp. Culture material from
middle small intestine of all five children show
growths of 10^5 bacteria/ml (1 case), 10^6/ml (1 c
and 10^7/ml (3 cases). Enteropathogenous *Escheri*
coli was isolated in only one case and exclusive
from the stool culture. In contrast to the abov
results, there was no aerobic flora development
of 11 healthy controls (ages 7 months to 8 yr);
aerobic flora development was observed, concentr
tions did not surpass 10^4 bacteria/ml. It is su
gested that the elevated incidence of overgrowth
small intestinal aerobic flora in children with
acute diarrhea may play an important role in the
pathology of this disorder.

5170 EPIDEMIC DIARRHEA AT CRATER LAKE FROM TEROTOXIGENIC Escherichia coli. A LAR WATERBORNE OUTBREAK.

(Eng.) Rosenberg, M. L.; Koplan, J. P.; Wachsmuth, I. K.; Wells, J. G.; Gangarosa, E. J.; Guerrant, R. L.; Sack, D. A. (Center for Disease Control, Atlanta, GA 30333). *Ann. Intern. Med.* 86(6):714-718; 1977.

An epidemiologic study of an outbreak of diarrhe
caused by contaminated water is reported. In Ju
and July 1975, gastrointestinal illness occurred
more than 200 staff members and 2,000 visitors t
an American national park. It was characterized
prolonged diarrhea, cramps, nausea, and vomiting
lasted a median duration of 8 days; and was sig-
nificantly associated with consumption of park w
($p < 0.001$) that had been contaminated by raw sewa
Enterotoxigenic *Escherichia coli* serotype 06:K15
was isolated from 20/49 ill park residents and f
the park's water supply, but not from 71 residen
who had never been ill or had been well for at
least 4 days. No other bacterial, viral, or par
sitic pathogens were isolated from ill or well p
sons. This outbreak is the first waterborne epi
demic of diarrheal illness shown to be due to en
otoxigenic *E. coli*, and this study documents one
mode of transmission of this pathogen. This inv
tigation also suggests the relative insensitivit
of current methods for identifying persons infec
with this organism, either by the culturing of r
domly selected isolates or by measuring serologi
responses.

5171 THE PATHOGENESIS OF SHIGELLA DIARRHEA. VI. TOXIN AND ANTITOXIN IN Shigella flexneri AND Shigella sonnei INFECTIONS IN HUMANS. (Eng.) Keusch, G. T.; Jacewicz, M. (Mount Sinai Sch. Medicine, New York, NY 10029). *J. Infect. Dis.* 135 (4):552-556; 1977.

Two strains of *Shigella flexneri* (17189 and Sky) and one of *S. sonnei* (18279) were studied for toxin production *in vitro*. HeLa cell cytotoxin was produced by all three strains; this toxin showed marked similarity to that produced by *S. dysenteriae* 1. Each toxin eluted in two distinct peaks on chromatography with Sephadex G-150, was destroyed by heating at 90 C for 30 min, and was neutralized by *S. dysenteriae* 1 antitoxin. Four patients with infections due to *S. flexneri* and *S. sonnei* developed antibody that neutralized *S. dysenteriae* 1 toxin *in vitro*. In three of seven positive sera studied by sucrose density-gradient ultracentrifugation, antibody activity was associated only with the IgM fraction. The time course of the antibody response resembled that found in infections due to *S. dysenteriae* 1, in which an IgM antitoxin antibody has also been described. Since three species of *Shigella* have been shown to be toxigenic, it is possible that bacterial toxin may play a role, along with bacterial invasion, in the pathogenesis of infections due to *S. flexneri* and *S. sonnei*, as well as those due to *S. dysenteriae* 1.

5172 BRIEF COMMUNICATION: THE GARDNER SYNDROME: A FAMILY STUDY IN CELL CULTURE. (Eng.) Danes, B. S.; Krush, A. J. (Lab. Cell Genetics, Dept. Medicine, Cornell Univ. Medical Coll., New York, NY 10021). *J. Natl. Cancer Inst.* 58(3):771-775; 1977.

The *in vitro* detection of increased tetraploidy in skin cultures of epithelial and fibroblast cells was investigated as a method for determining Gardner's syndrome, an autosomal dominant disorder, prior to its clinical manifestation in the intestine. Six families comprising 28 clinically affected individuals, 50 who might carry the gene for the syndrome, and 59 who were not at risk of developing the syndrome were examined. Increased tetraploidy was found to be specific for epithelioid cells and was observed in 9-22% of the cells taken from the 28 affected members. The percentage of cells showing increased tetraploidy was consistent during repeated tests for each individual and was apparently not influenced by age. Increased tetraploidy was also observed in 10-35% of the cells taken from 19/50 members who were at risk of developing the syndrome. No increased tetraploidy (<6%) was found in 56/59 members who were not at risk. The possible nonspecificity of increased tetraploidy for Gardner's syndrome is discussed.

5173 CLINICAL IMMUNITY IN ACUTE GASTROENTERITIS CAUSED BY NORWALK AGENT. (Eng.) Parrino, T. A.; Schreiber, D. S.; Trier, J. S.; Kapikian, A. Z.; Blacklow, N. R. (Univ. Massachusetts Medical Sch., 55 Lake Ave. North, Worcester, MA 01605). *N. Engl. J. Med.* 297(2):86-89; 1977.

To examine immunity in viral gastroenteritis, 12 volunteers were challenged and rechallenged with Norwalk agent; symptoms, jejunal biopsies, and serum antibody were evaluated. With the first challenge, gastroenteritis developed in six volunteers. When rechallenged 27 to 42 months later, these six again had gastroenteritis with jejunal lesions; in the six previously immune volunteers, illness or jejunal lesions did not develop. Four of five ill volunteers had increases in serum antibody to Norwalk agent after both challenges. Serum antibody did not increase in three immune volunteers after either challenge. Four volunteers who had become ill twice underwent a third challenge 4-8 weeks after their second illness. Gastroenteritis developed in one. These findings indicate two forms of immunity for viral gastroenteritis, one of short and the other of long duration. Factors other than serum antibody appear to be important in immunity to Norwalk gastroenteritis.

5174 INTESTINAL IMMUNOCYTES AND IMMUNOGLOBULINS IN PATIENTS WITH PRIMARY HYPOGAMMAGLOBULINEMIA. STUDY OF 26 CASES. (Fre.) Matuchansky, C.; Galian, A.; Goldfain, D.; Rambaud, J. C.; Modigliani, R.; Bernier, J. J. (Hopital Saint-Lazare, F-75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(4): 331-343; 1977.

The number of gut immunocytes was compared with serum Ig levels in 19 patients with primary hypogammaglobulinemia (PH) and 7 patients with selective IgA deficiency (AD). Direct immunofluorescence was used to count IgA, IgG, and IgM immunocytes in the jejunal, colonic, and rectal mucosa, and the IgA levels in the jejunal and salivary fluids were measured. All the patients with AD had no or very few IgA gut immunocytes, while their IgM immunocyte levels were normal or increased. Of the 19 patients with PH, 11 had no recognizable gut immunocytes and nonexistent or very low IgA levels; 6 patients had normal immunocyte numbers in one or more intestinal segments, and 2 with normal serum IgA levels had very few IgA immunocytes in the jejunum. There was no correlation between low numbers of gut immunocytes and the frequency of gastrointestinal abnormalities, except for giardiasis. These findings confirm the dissociation between gut immunocytes and serum immunoglobulin levels and emphasize the need for multiple gut biopsies in PH patients.

5175 GASTRIC EMPTYING AND SECRETION IN ZOLLINGER-ELLISON SYNDROME. (Eng.) Dubois, A.; Van Eerdewegh, P.; Gardner, J. D. (Natl. Naval Medical Center, Bethesda, MD 20014). *J. Clin. Invest.* 59(2):255-263; 1977.

Intragastric volume and rates of gastric emptying and secretion were determined in three patients with Zollinger-Ellison Syndrome (ZES) with and without metiamide administration and in seven normal subjects with and without pentagastrin administration. Gastric hypersecretion was observed both in patients with ZES (9- to 28-fold) and in normal subjects (4- to 18-fold) receiving pentagastrin (5 μg/kg/hr). The fraction of gastric contents emptied per minute (fractional rate of emptying) was three to five times greater in ZES patients (19 ± 6%/min) and was unchanged in normal subjects receiving pentagastrin (6 ± 0.7%/min). The increased fractional rate of gastric emptying in fasting patients with ZES persisted (16 ± 2%/min) despite abolition of gastric hypersecretion by metiamide (4 mg/kg/hr). The administration of metiamide reduced the volume of the intragastric contents to 10 ± 0.4 ml as compared to 24 ± 5 ml of normal fasting subjects and 42 ± 6 ml of ZES patients. After administration of a 250 ml liquid meal, the rate of gastric water secretion increased to the same extent both in normal subjects and in patients with ZES, but in the ZES group, the secretory rate returned to basal values more rapidly than it did in normal subjects. The increased fractional gastric emptying seen in patients with ZES syndrome is not attributable to hypergastrinemia or to gastric hypersecretion but may be caused by an undefined nervous or humoral factor.

5176 LIVER DISEASE IN RENAL TRANSPLANT RECIPIENTS.

(Eng.) Anuras, S.; Piros, J.; Bonney, W. W.; Forker, E. L.; Colville, D. S.; Corry, R. J. (Univ. Hosp., Iowa City, IA 52242). *Arch. Intern. Med.* 137(1):42-48; 1977.

The causes, history, and prognosis of liver disease in patients on renal transplant service were investigated. Fourteen of 156 (8.9%) patients developed significant liver diseases 7 weeks-15 months after renal transplantation. Nine had chronic hepatitis (patients 1-9), 2 had acute cytomegalovirus hepatitis (patients 10 and 11), and one each had fulminant herpes simplex hepatitis (patient 13 died of acute liver failure), granulomatous hepatitis (patient 12), intrahepatic cholestasis (patient 7), and severe fatty metamorphosis (patient 14 died). Patient 7 had prolonged intrahepatic cholestasis and then acute cytomegalovirus hepatitis followed by rejection. Chronic active hepatitis appeared following a second renal transplant. In general, patients 1-9 had few symptoms of liver disease, even though the course of chronic active hepatitis was progressive. Large doses of prednisone and discontinuation of azathioprine or methyldopa had no effect on liver function. Bilirubin increased only slightly (<3 mg/100 ml). Marked elevation of the SGOT value (150-1,650 mU/ml), elevation in the alkaline phosphatase value (195-675 mU/ml), and elevation of the globulin level (3-4.2 g/100 ml) were seen. Hepatitis B surface antigen was persistently positive in three patients (patients 1, 5, and 8). Cirrhosis ultimately developed in five of the nine patients (patients 1, 2, 5, 6, and 9). Patients 1 and 2 died of hepatic failure and patient 6 because of *Pseudomonas septicemia*. All of the remaining survivors had abnormal liver function test results.

5177 ANTRAL GASTRIN CONCENTRATION IN UPPER GASTROINTESTINAL DISEASE.

(Eng.) Hughes, W. S.; Snyder, N.; Hernandez, A. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Dig. Dis.* 22(3):201-208; 1977.

Antral gastrin concentration (AGC) was measured in prepyloric mucosa specimens obtained by forceps biopsy during endoscopic examination of 174 patients. AGC in 32 patients with normal endoscopic findings (controls) varied from 2 to 38.6 ng gastrin/mg tissue. The mean AGC of the control patients was 14.2 ± 1.4 ng gastrin/mg tissue. AGC was similar to control values in 18 patients with duodenal ulcer (14.7 ± 2.1 ng/mg), 12 patients with a pyloric channel or antral ulcer (16.4 ± 3.5 ng/mg), and 48 patients with miscellaneous diagnoses (14.3 ± 1.5 ng/mg). AGC was significantly less than control values in 13 patients with an ulcer in the body or fundus of the stomach (5.9 ± 1.5 ng/mg) and in 4 patients with the Zollinger-Ellison syndrome (4.9 ± 2.4 ng/mg). AGC was significantly greater than in control values in 16 patients with gastritis (25.8 ± 4.3 ng/mg), 22 patients with esophagitis (23.2 ± 3.0 ng/mg), and 9 patients with gastric atrophy and fasting serum hypergastrinemia (44.6 ± 12.3 ng/mg). In 77 of these patients with heterogeneous diagnoses, meal-stimulated 3-hr integrated gastrin output was directly related to AGC ($r=0.47$, $p<0.001$). In a group of 106 patients, AGC was inversely related to histalog-stimulated maximum acid output. The correlation was very weak ($r=-0.20$) but significant ($p<0.05$). The authors conclude that the most likely cause for sample variation in antral gastrin concentration is a combination of three factors: the inherent variability of the gastrin content within the antrum, inadvertent biopsy of tissue outside the antral area, and the presence of patchy disease in the antrum accompanied by irregular loss of G cells.

5178 CELL CONTACTS AND POLYSOMES IN IRRADIATED HUMAN JEJUNAL MUCOSA AT ONSET OF EPITHELIAL REPAIR.

(Eng.) Wartiovaara, J.; Tarpila, S. (Third Dept. Pathology, Univ. Helsinki, Haartmaninkatu 3, 00290 Helsinki 29, Finland). *Lab. Invest.* 36(6):660-665; 1977.

To investigate the early events of jejunal repair, the epithelial ultrastructure was studied in the jejunal biopsies of six patients that had received abdominal irradiation 1-3 days previously. There were major changes in the typical atrophic areas lacking villi. Cell contacts were loose between surface epithelial cells lacking signs of degenerati and extracellular gaps were visible between the lateral membrane interdigitations. Numerous processes from these epithelial cells extended into the underlying basement membrane and sometimes, especially in crypt areas, came into close contact with processes from the underlying mesenchymal cells The epithelial cells often had enlarged nucleoli with granular threads. Increased amounts of epithelial cells were also seen with numerous membrane-free polysomes. The study suggests that at the onset of jejunal epithelial regeneration in man, an epitheliomesenchymal cell interaction takes place similar to that described in normal gut development in laboratory animals. The increase in polysomes is interpreted as a morphologic sign of activated protein synthesis in the differentiating cells of the epithelium.

5179 A STUDY ON THE NATURE OF MACROAMYLASE COMPLEX. DISSOCIATION OF MACROAMYLASE BY SUBSTRATES. (Eng.) Kitamura, T.; Yoshioka, K.; Ehara, M.; Akedo, H. (Center Adult Diseases, Osaka, Higashinari-ku, Osaka 537, Japan). *Gastroenterology* 73(1):46-51; 1977.

Characteristics of a macroamylase from a human subject that was considered not to be formed by the binding of normal amylase to immunoglobulins were studied. The macroamylase was reversibly dissociated into apparently normal amylase by treating the macroamylasemic serum with guanidine hydrochloride. Concanavalin A precipitated a large portion of the macroamylase. When the macroamylase was purified by affinity chromatography using an insoluble starch polymer at neutral pH, a considerable dissociation of the enzyme into apparently normal amylase was observed with the purified preparation. Such dissociation of the macroamylase was demonstrated by briefly incubating the patient's serum with a low molecular weight starch, a substrate of the enzyme. Electrophoresis showed that this dissociated enzyme had essentially the same isozymic pattern as that of normal serum amylase. Reconstitution of the macroamylase occurred when the patient's serum was incubated with the low molecular weight starch for a prolonged period to hydrolyze the starch completely, and when the serum was dialyzed. The amylase-binding substance(s) that is supposed to be involved in the formation of macroamylase was found to be released when the enzyme was adsorbed on the insoluble starch polymer at 0 C. The results suggest that the amylase-binding substance(s) binds to the substrate-binding site of normal amylase to form a macroamylase complex.

5180 LACK OF CORRELATION BETWEEN NITROGEN BALANCE AND SERUM INSULIN LEVELS DURING PROTEIN SPARING WITH AND WITHOUT DEXTROSE. (Eng.) Freeman, J. B.; Stegink, L. D.; Wittine, M. F.; Danney, M. M.; Thompson, R. G. (Univ. Hosp., Iowa City, IA 52242). *Gastroenterology* 73(1):31-36; 1977.

The hypothesis that the decreased insulin levels observed during protein sparing therapy are the major factor accounting for the favorable nitrogen balance seen in surgical patients receiving amino acid infusions was tested. Eight morbidly obese patients received amino acid infusions, with and without added dextrose, for sequential 4-day study periods after major abdominal surgery, in a crossover design. Daily infusion of 3 l of 5% amino acids increased lipolysis compared to a dextrose control period. This was evidenced by a small rise in free fatty acid levels from 0.76 ± 0.10 to 0.85 ± 0.05 mM and a rise in ketone body levels from 0.15 ± 0.02 to 0.44 ± 0.04 mM ($p<0.01$). Serum insulin levels fell from 33.3 ± 5.9 to 22.3 ± 2.6 μU/ml, and nitrogen balance improved from -12.3 ± 4.7 to -1.3 ± 1.8 g/day ($p<0.001$). The addition of 50 g of dextrose to each liter of amino acid solution resulted in the return of insulin, free fatty acid, and ketone body levels to values noted during the dextrose infusion period, but did not affect nitrogen balance. The order of the amino acid and the amino acid plus dextrose infusion periods did not affect the results. Glucagon and growth hormone levels did not differ significantly between study periods. The improved nitrogen balance noted during peripheral amino acid infusion is not attributable to insulin changes alone, but is related both to the availability of an adequate exogenous supply of essential amino acids, and the ability of the body to mobilize endogenous lipid supplies.

5181 ZOLLINGER-ELLISON SYNDROME AND PARATHYROID ADENOMA. LIMITS OF WERMER'S SYNDROME. (Fre.) Champault, G.; Chapuis, Y.; Patel, J. C.; Louvel, A.; Ghozlan, R.; Cachin, M.; *et al.* (Hopital Cochin, Paris, France). *J. Chir. (Paris)* 112(3):131-144; 1976.

5182 TUBERCULOSIS OF THE GASTROINTESTINAL TRACT: REPORT OF 11 CASES. (Jpn.) Ohashi, H.; Sakamoto, T.; Yamamoto, M.; Kashiki, Y.; Kunieda, T.; Sakata, K.; *et al.* (Sch. Medicine, Gifu Univ., Gifu, Japan). *Arch. Jpn. Chir.* 44(1):56-60; 1975.

5183 EXCISION, DERIVATION, AND EXCLUSIVELY PARENTERAL NUTRITION IN THE TREATMENT OF NECROTIC ENTEROCOLITIS IN THE NEW-BORN CHILD. (Fre.) Juskiewenski, S.; Vaysse, P.; Ghisolfi, J.; Roland, M.; Ser, N.; Bacque, P. (Hopital Purpan, C.H.R. de Toulouse, 31052 Toulouse-Cedex, France). *Ann. Chir. Infant.* 18(2):141-148; 1977.

5184 METABOLIC CONSEQUENCES OF INTRAVENOUS NUTRITION. (Fre.) Govaerts, J. P.; Quintin, J.; Saric, O.; Askenasi, R. (Service de Chirurgie, IMC Ixelles, Rue J. Paquot 61-63, B-1050 Brussels, Belgium). *Acta Gastroenterol. Belg.* 40(3/4):148-158; 1977.

5185 DISEASES OF THE ALIMENTARY SYSTEM. GASTROINTESTINAL REACTIONS TO DRUGS. (Eng.) Paton, A. (Dudley Rd. Hosp., Birmingham B18 7QH, England). *Br. Med. J.* 2(6045):1179-1180; 1976.

5186 ABDOMINAL SURGERY IN TOGO (WEST-AFRICA) AND CENTRAL EUROPE. (Ger.) Gogler, H. (Chirurgische Klinik, Klinikum Westend der Freien Universitat Berlin, Spandauer Damm 130, D-1000 Berlin 19, W. Germany). *Zentralbl. Chir.* 102(9):548-552; 1977.

5187 MOLECULAR EVOLUTION OF GUT HORMONES: APPLICATION OF COMPARATIVE STUDIES ON THE REGULATION OF DIGESTION. (Eng.) Dockray, G. J. (Physiological Lab., Univ. Liverpool, Liverpool, England). *Gastroenterology* 72(2):344-358; 1977.

5188 THE INFLUENCE OF A DIET RICH IN WHEAT FIBRE ON THE HUMAN FAECAL FLORA. (Eng.) Drasar, B. S.; Jenkins, D. J. A.; Cummings, J. H. (Public Health Lab. Service, Colindale Ave., London NW9 5DX, England). *J. Med. Microbiol.* 9(4): 423-431; 1976.

5189 ELECTROMYOGRAPHIC STUDY OF GASTRODUODENAL MOTIVITY IN MAN AFTER PROXIMAL GASTRIC VAGOTOMY (PGD) FOR DUODENAL ULCER. (Eng.) Salducci, J.; Naudy, B.; Picaud, R.; Dalmas, H.; Monges, H. (C.H.U. Nord Marseilles 13326 Cedex 3, France). *Eur. Surg. Res.* 8(Suppl. 2):72-73; 1976.

5190 STUDY OF THE POSTOPERATIVE MYOELECTRICAL ACTIVITY OF THE GASTROINTESTINAL TRACT [Abstract]. (Eng.) Dauchel, J.; Schang, J. C.; Jaeck, D.; Eloy, M. R.; Grenier, J. F. (Unite de Recherches 61 de l'INSERM, Avenue Moliere, 67200 Strasbourg, Hautepierre, France). *Eur. Surg. Res.* 8(Suppl. 2):71-72; 1976.

5191 PEDIATRIC GASTROENTEROLOGY 1/1/69-12/31/75: A REVIEW. PART I. HOLLOW VISCERA AND THE PANCREAS. (Eng.) Andorsky, M.; Finley, A.; Davidson, M. (Bronx-Lebanon Hosp. Center, 1650 Grand Concourse, Bronx, NY 10457). *Am. J. Dig. Dis.* 22(1):56-68; 1977.

5192 URINARY AND FAECAL EXCRETION OF MARKER CALCIUM (^{46}Ca) BY LOW BIRTHWEIGHT INFANTS. (Eng.) Sutton, A.; Mole, R. H.; Barltrop, D. (MRC Radiobiology Unit, Harwell, England). *Arch. Dis. Child.* 52(1):50-55; 1977.

5193 CALCIUM CARBONATE AND CONSTIPATION: A HISTORICAL REVIEW OF MEDICAL MYTHOPOEIA. (Eng.) Clemens, J. D.; Feinstein, A. R. (Intern, Medical Service, Case-Western Reserve Sch. Medicine, Cleveland, OH). *Gastroenterology* 72(5, Part 1):957-961; 1977.

5194 TREATMENT OF CHRONIC CONSTIPATION WITH A NEW MEDICINAL ASSOCIATION (SODIUM - PICOSULPHATE + POLOXALKOL). (Por.) Siffert, G., Jr. (Clinica de Gastrenterologia da Policlinica Geral do Rio de Janeiro, Brazil). *Rev. Bras. Clin. Ter.* 6(1):33-38; 1977.

5195 THERAPEUTIC USE OF A NEW DRUG ASSOCIATION LAXATIVE-EMOLLIENT IN PREGNANT WOMEN. (Por.) Neto, M. C. (Servico de Higiene Pre-Natal do Centro de Saude III, Casa Verde, DRS 1, Sao Paulo, Brazil). *Rev. Bras. Clin. Ter.* 6(2):89-94; 1977.

5196 DIARRHEA ASSOCIATED WITH DECREASED TRANSIT TIME: A CLINICAL, BIOLOGICAL, RADIOLOGICAL, ANATOMICAL AND ETIOLOGICAL EVALUATION OF 56 PATIENTS. (Fre.) Labayle, D.; Modigliani, R.; Matuchansky, C.; Rambaud, J. C.; Bernier, J. J. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(3):231-242; 1977.

5197 ROLE OF VIP IN DIARRHOEA [Abstract]. (Eng.) Modlin, I. M.; Bloom, S. R.; Mitchell, S. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5):A418-A419; 1977.

5198 SERUM BILE ACIDS IN PROTRACTED DIARRHEA OF INFANCY [Abstract]. (Eng.) Lloyd-Still, J. D.; Demers, L. (Northwestern Univ. Medica Sch., Chicago, IL). *In: The American Pediatric Society and The Society for Pediatric Research Combined Program and Abstracts.* (San Francisco, California):p. 446; 1977.

5199 THE EFFECT OF LACTOSE ON DIARRHEA IN THE TREATMENT OF KWASHIORKOR [Abstract]. (Eng.) Rothman, D.; Habte, D.; Latham, M. (Div. Nutr. Sci., Cornell Univ., Ithaca, NY 14853). *Fed. Proc.* 36(3):1092; 1977.

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5201 SERUM VITAMIN A IN NEONATES [Abstract]. (Eng.) Hall, J. A., Jr.; Brandt, R. B.; Mueller, D. G.; Schroeder, J. R.; Kirkpatrick, B. V. (No affiliation given). *Va. Med.* 104(8):572; 1977.

5202 SURVEY OF GASTROENTERITIS IN CHILDREN ADMITTED TO HOSPITAL IN NEWCASTLE UPON TYNE IN 1971-1975. (Eng.) Pullan, C. R.; Dellagrammatikas, H.; Steiner, H. (Fleming Memorial Hosp. Sick Children, Newcastle upon Tyne, NE2 3BD England). *Br. Med. J.* 1(6061):619-621; 1977.

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5216 EPIDEMIOLOGICAL IMPORTANCE OF THE ISOLATION OF SALMONELLAS FROM DOGS. (Ger.) Boos, G. (Veterinar-Untersuchungsstelle der Bundeswehr IV, Freiligrathstr. 6, D-6500 Mainz, W. Germany). *Zentralbl. Bakteriol.* [*Orig. B*] 164(4):368-380; 1977.

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5231 PASSAGE OF BARIUM MEAL THROUGH ESOPHAGUS IN PATIENTS WITH BALLOON TAMPONADE OF ESOPHAGEAL VARICES. (Eng.) Andersen, J. R.; Agger, P. (Fragariavej 13, DK-2900-Hellerup, Denmark). *Scand. J. Gastroenterol.* 11(6):561-563; 1976.

5232 SYSTEMIC AMYLOIDOSIS AND MULTIPLE MYELOMA. REPORT OF A CASE WITH THE ASSOCIATION OF LIGHT CHAIN MYELOMA AND GASTRIC PLASMACYTOSIS. (Fre.) Libeskind, M.; Malbran, J.; Lugagne, F.; Agard, D.; Gatineau-Saillant, C.; Guyet-Rousset, P. (Centre Hospitalier de Gonesse, F 95500 Gonesse, France). *Gastroenterol. Clin. Biol.* 1(3):267-274; 1977.

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5236 IRRADIATION TREATMENT OF MALIGNANT TUMORS OF THE SALIVARY GLANDS. (Eng.) Tapley, N. duV. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX). *Ear Nose Throat J.* 56(3):110-114; 1977.

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5238 THE EFFECTS OF PREGNANCY ON BILE SALT TURNOVER [Abstract]. (Eng.) O'Sullivan, G.; Walker, K.; Bondar, G. F. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2H7, Canada). *Eur. Surg. Res.* 8(Suppl. 1): 23-24; 1976.

See also, 4549, 4653, 4695, 4697, 4702, 4751, 4755, 4756, 4769, 4816, 4827, 4893, 4894, 4895, 4896, 4902, 4932, 4938, 5040, 5125.

Parasitology

5239 CELLULAR SENSITIVITY IN AMOEBIASIS--PRELIMINARY RESULTS OF LYMPHOCYTIC TRANSFORMATION IN RESPONSE TO SPECIFIC ANTIGEN AND TO MITOGEN IN CARRIER AND DISEASE STATES. (Eng.) Harris, W. G.; Bray, R. S. (Medical Res. Council Lab., P.O. Box 273, Banjul, Gambia). *Trans. R. Soc. Trop. Med. Hyg.* 70(4):340-343; 1976.

The cellular sensitivity to *Entamoeba histolytica* was determined in unexposed subjects, asymptomatic amebiasis carriers, patients with clinical amebiasis, and patients with amebic liver abscesses. Specific anti-amebic IgM and IgG were measured by a fluorescent antibody method. Lymphocyte cultures were stimulated with amebic antigen at a final culture concentration of 1 μg and 10 μg/ml protein. The six unexposed subjects without amebiasis showed no evidence of immunological sensitivity; antibody titers were not significant and no lymphocyte transformation was stimulated by amebic antigen. The 10 asymptomatic carriers (i.e., passing cysts in the stools) had slightly elevated specific anti-amebic IgM (10-40) and IgG (20-160), but did not show significant transformation to amebic antigen. Cells from these patients responded normally to phytohemagglutinin, purified protein derivative of tuberculin, and malaria antigen. Cells from the nine patients with clinical amebic dysentery and from the six patients with liver abscess showed significant transformation, and this was more marked in the cells from the patients with liver abscess. Antibody levels among the two patient groups were higher than those in the first two groups, and were particularly high among the patients with liver abscesses (20-32 for IgM; 160-1,000 for IgG). Primary invasion of amebae into the bowel (at clinical or subclinical level) may be associated with a degree of specific cellular immunodepression, which operates on the afferent pathway rather than by inhibiting or destroying effector cells, as no central sensitization can be detected.

5240 INVASIVE AMEBIASIS. I. AMEBIC DYSENTERY AND ITS COMPLICATIONS. (Eng.) Adams, E. B.; MacLeod, I. N. (Dept. Medicine, Univ. Natal, Durban, South Africa). *Medicine* 56(4):315-323; 1977.

The records of 5,087 patients with invasive amebiasis admitted to one medical unit over a 20-yr period were examined to determine the efficacy of treatment in uncomplicated cases and the dangers of complications. Intestinal amebiasis was present in 3,013 cases. Excellent results followed treatment of uncomplicated dysentery (2,854 cases) with various drug combinations or with metronidazole alone and maintenance of fluid balance (fatality rate, 0.5%). Peritonitis was the most common and dangerous complication (fatality rate, 40.2%). Slow leakage over a wide area of bowel rather than acute rupture from one site was the usual type encountered. Since surgery is hazardous in these patients because of the friable state of the bowel, treatment consists of amebicides, antibiotics, and the maintenance of fluid and electrolyte balance. The high death rate is part[illegible] to many patients being admitted late in the course of the disease, i.e., with established peritoni[illegible]. The prognosis is much better in those who develop slow onset-type peritonitis in the hospital. [illegible] common and less dangerous complications are [illegible]ture formation, ameboma, and ulcerative pos[illegible]enteric colitis.

5241 INVASIVE AMEBIASIS. II. AMEBIC LIVER ABSCESS AND ITS COMPLICATIONS. ([illegible] Adams, E. B.; MacLeod, I. N. (Dept. Medicine, [illegible] Natal, Durban, South Africa). *Medicine* 56(4):[illegible]334; 1977.

The records of 2,074 patients with hepatic amebiasis admitted to one medical unit over a 20-yr period were analyzed to determine the efficacy of tre[illegible]ment with tissue amebicides and aspiration of the abscess and, also, the dangers of some of the complications. When the abscess remained confined to the liver, the fatality rate was low (0.7%). Metronidazole combined with aspiration appears to be the treatment of choice. In contrast, w[illegible] there was extension into the pericardium, the fatality rate was high (29.6%). Amebic pericarditis presents in three ways: as pericarditis complicating a known case of amebic liver abscess, [illegible] cardiac failure of obscure etiology, and i[illegible] from rapid cardiac tamponade. The latter two varieties are readily missed. When the pleura[illegible] lungs are involved, the prognosis is relatively good (fatality rate, 6.2%), probably because hepatobronchial fistula being common, amebic pus is often coughed up, providing spontaneous dra[illegible] and pleural effusions are readily diagnosed [illegible] aspirated. Peritonitis arising from the ruptur[illegible] a liver abscess carries a better prognosis than [illegible] intestinal variety. Here the treatment of choic[illegible] surgical drainage, since friable bowel wall does not complicate the procedure.

5242 MECHANISM OF MALABSORPTION IN GIARDIASIS: A STUDY OF BACTERIAL FLORA AND BILE SALT DECONJUGATION IN UPPER JEJUNUM. (Eng.) Tandon, B. N.; Tandon, R. K.; Satpathy, B. K.; Shriniwas (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Gut* 18(3):176-181; 1977.

Because bacterial overgrowth is associated with bile salt deconjugation in some situations, the bacterial content and bile acid profile were determined in intestinal aspirates of patients with giardiasis and steatorrhea. Sixty-three unselected patients with giardiasis, with no evidence of other systemic disease, were scre[illegible] for evidence of steatorrhea. No patient had any evidence of protein-energy malnutrition. Seventeen of the patients had steatorrhea, 3 of whom also had D-xylose malabsorption. Vitamin B_{12} absorption was normal in all. Bacterial culture and qual[illegible] analysis of bile salt in jejunal fluid were carried out in the 17 patients and in 13 additional patients with normal absorptive parameters (8 cases of irritable bowel syndrome and 5 cases of *Giardia* infection), who served as controls. Significant bacterial overgrowth was noted in 8/17 cases and in none of the controls. All patients showing bacterial overgrowth had free bile acids in their duodenal aspirate. Free bile acids were also detected in jejunal aspirates of five of seven patients without bacterial overgrowth. Two control cases of *Giardia* infection with normal small bowel function and sterile duodenal aspirate showed evidence of bile salt deconjugation. The results suggest that bacterial overgrowth and bile salt deconjugation are involved in the pathogenesis of fat malabsorption in giardiasis.

5243 HYDATID DISEASE IN NEW ZEALAND: CHANGING PATTERNS IN HUMAN INFECTION, 1878-1972.

(Eng.) Burridge, M. J.; Schwabe, C. W.; Fraser, J. (Coll. Veterinary Medicine, Box J-125, JHMHC, Univ. Florida, Gainesville, FL 32610). *N.Z. Med. J.* 583(85):173-177; 1976.

Temporal trends in the prevalence and incidence of human hydatid disease in New Zealand were studied with respect to the different phases in echinococcal control. The prevalence rate increased steadily from 1878 to 1954. There were 1,342 new cases of hydatid disease diagnosed in public hospitals between 1951 and 1972. The incidence rate was more than six times as high for Maoris as for non-Maoris and slightly higher for men than for women. The age-specific incidence rates declined most rapidly in children, especially in the 0-4 yr age group, during 1961-1970. There was little difference in the temporal trend in incidence by sex. There was a continuous decrease in the incidence rate of hydatid disease from 1951 to 1972 for non-Maoris, but no marked reduction was seen in Maoris until after 1960. The most common sites of hydatid cysts in the 1,290 new cases diagnosed between 1951 and 1970 were the liver of 47.3% of the patients, the lung in 30.8%, and in the abdomen (excluding the liver) of 18.4%. This study shows that although a decrease in the incidence of human hydatid disease started in the early 1950's, marked reduction in incidence in young children and in Maoris was not evident until after the intensification of control activities in 1957.

5244 PRIMARY PERFORATED PANCREATIC HYDATIDOSIS.

(Spa.) Miguel Velasco, J. E.; Dominguez Sayans, J.; Suarez San Pedro, F.; Parada Herrero, R.; Soleto Saez, E.; Landa, I. (Ciudad Sanitaria de la Seguridad Social "La Paz," Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):771-784; 1976.

Primary perforated pancreatic hydatid disease is an extremely rare disorder that occurs principally in Mediterranean and South American countries and Australia. In the case presented, a 12-yr-old boy had undergone splenectomy for ruptured spleen due to trauma. During the operation, no sign of hydatid disease was noted. Two months later, the child presented with abdominal pain, and radiography revealed marked displacement of stomach and liver. During the examination period, the child developed acute abdomen and underwent emergency laparotomy. A hydatid cyst, which contained 4 l of fluid, was drained and removed from the head of the pancreas. No other sites of hydatid disease were discovered; the child recovered and showed no further indications of the disease. In reviewing the literature, the authors discuss the etiopathology, symptomology, diagnosis, prognosis, possible complications, and treatment for pancreatic hydatid disease.

5245 MORBIDITY FROM Schistosoma mansoni INFECTIONS: AN EPIDEMIOLOGIC STUDY BASED ON QUANTITATIVE ANALYSIS OF EGG EXCRETION IN ETHIOPIAN CHILDREN.

(Eng.) Hiatt, R. A.; Gebre-Medhin, M. (Sch. Public Health, Univ. California, Berkeley, CA 94720). *Am. J. Trop. Med. Hyg.* 26(3):473-481; 1977.

Morbidity from infection with *Schistosoma mansoni* was investigated in a population of school childre aged 7-16 yr, from a town in Ethiopia. Malaria was under control in the area, and *S. haemotobium* was not endemic. Quantitative fecal egg counts were determined for 336 children (94% of those in the school) by a thick-smear method; other intestinal parasites were determined by a formol-ether concentration method. Morbidity was measured by a standardized medical examination of 272 of these children and was analyzed in four categories of egg count intensity: 0 (12%), 1-100 (19%), 101-500 (40%), and >501 (29%) eggs per gram (epg). Prevalence was 88%, and the geometric mean egg count was 259 epg. The highest prevalence and intensity were found in 12-yr-olds (95% and 300 egp, resp.). No schistosomiasis-associated symptoms were significantly related to the intensity of *S. mansoni* infection, although blood in the stool was more frequent in groups with higher egg counts. There was a trend for hepatomegaly (especially of the left lobe) to increase in frequency with increasin egg count, but this trend was not significant. No splenic enlargement was present. Anthropometric weight-for-height measurements, average school grade, and days absent from school were not related to the intensity of *S. mansoni* infections. Physical performance was better in uninfected boys but there was no correlation with the intensity of infection. The minimal morbidity is compatible with the moderately low intensity of *S. mansoni* infection and with the findings of a previous population-based study in a neighboring village.

5246 CAUSES OF WEIGHT LOSS ASSOCIATED WITH ENTERIC PARASITISM [Abstract].

(Eng.) Ramaswamy, K.; Copeland, E. M.; Dudrick, S. J.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX 77030). *Fed. Proc.* 36(3):595; 1977.

5247 ENDEMIC AMOEBIC ABSCESS.

(Eng.) Brown, P.; Gash, D. B.; Shanks, J.; Jensen, I. (Middlemore Hosp., Auckland, New Zealand). *N.Z. Med. J.* 85(580):54-55; 1977.

5248 A STUDY OF CAUSE OF DEATH IN PATIENTS WITH FULMINANT AMEBIC COLITIS. (Eng.) Azar, H.; Nazarian, I.; Sadrieh, M. (Dept. Surgery, Pahlavi Univ., Shiraz, Iran). *Am. J. Proctol.* 28(1):80-84; 1977.

5249 GIARDIASIS [Letter to Editor]. (Eng.) Wright, S. G.; Tomkins, A. (Hosp. Tropical Diseases, London NW1 OPE, England). *Lancet* 2(8031):254; 1977.

5250 EVALUATION OF THE EFFECT OF DIFFERENT METHODS OF CONTROL OF SOIL-TRANSMITTED HELMINTHS IN KHUZESTAN, SOUTHWEST IRAN. (Eng.) Arfaa, F.; Sahba, G. H.; Farahmandian, I.; Jalali, H. (Univ. Teheran, Sch. Public Health, P.O. Box 1310, Teheran, Iran). *Am. J. Trop. Med. Hyg.* 26(2):230-233; 1977.

5251 INTESTINAL MYOELECTRIC ACTIVITY OF THE DOG DURING HOOKWORM INFECTION [Abstract]. (Eng.) Weisbrodt, N. W.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX 77030). *Fed. Proc.* 36(3):595; 1977.

5252 MEBENDAZOLE IN THE TREATMENT OF TAENIASIS SOLIUM AND TAENIASIS SAGINATA. (Eng.) Chavarria, A. P.; Villarejos, V. M.; Zeledon, R. (Apartado 688, San Jose, Costa Rica). *Am. J. Trop. Med. Hyg.* 26(1):118-120; 1977.

See also, 4674, 4737, 4738, 4739, 4747, 4943.

GENERAL

Regional Enteritis

5253 EARLY CANCER IN A SEGMENTAL COLITIS WITH LOCALIZED POLYPOSIS. (Spa.) Coronado Quesada, E. F.; Vaccarezza, C. M.; Mounier, C. A.; Loyato, H.; Rapaport, M.; Rubio, H. H. (Unidad de Gastroenterologia, Hosp. J. A. Fernandez, Buenos Aires, Argentina). *Arq. Gastroenterol.* 14(2):89-92; 1977.

A radiological and colonoscopic diagnosis of chronic "segmental" colitis, Crohn's disease, accompanied a histologic diagnosis of early intramucosal adenocarcinoma in a 66-yr-old man who presented with recurrent mucous diarrhea. The patient recovered satisfactorily after left hemicolectomy with a transverse sigmoidal anastomosis. Macroscopic and microscopic examination of the excised colonic segment revealed multiple polypoid adenomas with inflammatory polyps, diffuse glandular atrophy, a coarsened submucosa, and sympathetic cell hypertrophy. No microabscesses, histological fissures, fistulas, or granulomas were found.

5254 RECTAL BIOPSY AS A PROGNOSTIC GUIDE IN CROHN'S COLITIS. (Eng.) Ward, M.; Webb, J. N. (Western General Hosp., Edinburgh, Scotland). *J. Clin. Pathol.* 30(2):126-131; 1977.

The usefulness of rectal biopsy as an indicator of prognosis in Crohn's proctocolitis was assessed in 27 patients. The clinical course following biopsy was assessed, and the patients were included in one of four categories: (1) those remaining asymptomatic, (2) those showing continued moderate inflammatory activity, (3) those requiring colectomy, and (4) those dying as a direct result of colonic disease. The use of student's *t* test applied to first rectal biopsies showed a significant difference between scores of the death group and the moderate group ($p<0.05$) and between the death group and the asymptomatic group ($p<0.05$). In no biopsy (either first biopsy or subsequent biopsies) from patients in groups 1 and 2 was a fissure found, whereas these were present in between 30% and 50% of the biopsies in groups 3 and 4. Ulceration also suggested a poor prognosis. The results suggest that there are features to be found in the rectal biopsies of patients with Crohn's colitis that give some indication of the ultimate prognosis, and that biopsy appearances are relatively constant.

5255 FURTHER ELECTRON MICROSCOPIC EVIDENCE OF VIRUS-LIKE PARTICLES IN CROHN'S DISEASE. (Eng.) Riemann, J. F. (Medizinische Universitatsklinik, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 24(2):116-118; 1977.

Biopsy specimens from nine patients with Crohn's disease of the colon were studied ultrastructurally to identify and localize virus-like particles. In the biopsy specimens of the descending colon of seven patients, virus-like particles were encountere mainly in the epithelial cells and macrophages near ulcerative lesions. These particles had a double membrane and a sometimes electron-opaque central core. They were round to oval in shape, and their diameter was 30-70 nm. They were commonly located in clusters, but were also found singly in the cell cytoplasm. These observations support the suggestion that Crohn's disease is associated with a transmissible viral agent.

5256 MEDICAL MANAGEMENT OF CROHN'S DISEASE IN ADOLESCENCE. (Eng.) Whittington, P. F.;

Barnes, H. V.; Bayless, T. M. (Univ. Wisconsin Sch. Medicine, Madison, WI). *Gastroenterology* 72(6):1338-1344; 1977.

An attempt was undertaken to suppress the disease process throughout adolescence without unwanted drug side-effects in 16 adolescent patients with Crohn's disease. Fourteen patients received long-term prednisone therapy (initial mean dose, 1.05 mg/kg/day; after 6 months, 0.35 mg/kg/day) along with either salicylazosulfapyridine (dose range, 1.5-3.0 mg/kg/day) or tetracycline (dose range, 10.8-37.9 mg/kg/day) for 3.5 years. Two patients did not receive long-term prednisone therapy; they remained asymptomatic on tetracycline or salicylazosulfapyridine. By 1 yr after the beginning of therapy, 13/16 patients were asymptomatic, and only 1/16 required hospitalization for symptoms during the 3.5-yr follow-up period; the one patient rehospitalized underwent bowel surgery. Alternate day corticosteroid administration was attained in 11 patients. Ten of these patients were reported to be growing and developing at a normal rate. Total weight gain averaged 17.5 kg and height 152.4 cm in all 14 patients. Thirteen of 16 patients achieved pubertal development appropriate for the age. Eight patients with distal ileal disease gave excellent response to medical therapy; those with more extensive disease were difficult to manage. No major adverse effects from the drug therapy were reported to interfere with patients' regular activities. It is concluded that an effort to suppress disease activity continuously in adolescents with Crohn's disease is needed to correct the disease-related growth-rate suppression.

5257 ILEORECTAL ANASTOMOSIS IN PATIENTS WITH CROHN'S DISEASE OF THE COLON. (Eng.)

Flint, G.; Strauss, R.; Platt, N.; Wise, L. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Gut* 18(3):236-239; 1977.

Thirty-seven patients who had an ileorectal anastomosis performed for Crohn's disease of the colon were studied and compared with patients who had a total colectomy and ileostomy for the same disease. Twenty-nine operations were done as a primary procedure, and in eight the anastomosis was made after previous total or segmental colectomy. Three patients developed anastomotic leaks and died. No patient who had a diverting loop ileostomy performed at the time of ileorectal anastomosis developed anastomotic leaks before or after the ileostomy was closed. Of the 37 patients, 3 died postoperatively and another 5 have had less than a 1-yr follow-up. Of the remaining 29 patients, 12 had recurrences in either the rectum or ileum. Half of the recurrences took place 5 yr or more after surgery. Seven of the 12 patients with recurrences have had their anastomoses taken down. When this recurrence rate of 41% is compared with the recurrence of ileitis in patients after total colectomy and ileostomy for Crohn's disease of the colon, the incidence of recurrence is not markedly dissimilar. Of the patients who develop a recurrence after ileorectal anastomosis, only about half will have to have their anastomoses taken down. In this study, 59% of the patients had no recurrence and another 20.5% had a recurrence but the anastomosis did not have to be taken down. Thus, almost 80% of the patients have been able to lead a life unencumbered by an ileostomy, making ileorectal anastomosi
for this disease desirable in selected patients.

5258 CROHN'S DISEASE IN BLACK PATIENTS. (Eng.

Mosley, E., Jr.; Rogers, N.; Scott, V.; Chung, E. B.; Press, H. C., Jr.; Leffall, L. D., J
(Howard Univ. Hosp., Washington, DC 20060). *J. Na*
Med. Assoc. 69(4):219-222; 1977.

Experience with Crohn's disease at one hospital during a 10-yr period is reviewed, and differences in manifestation of the disease in a predominantly black population are noted. There were 13 patient
(10 women) with a diagnosis of Crohn's disease (transmural colitis, transmural enteritis, granulomatous colitis, granulomatous enteritis, ileocolit
and regional enteritis or colitis). The most comm
presenting symptoms were right lower quadrant pain (76.7%), diarrhea (69.2%), anorexia (69.2%), weigh
loss (53.8%), and vomiting (53.8%). The most comm
physical finding was right lower quadrant tenderne
(76.7%). The patients were grouped according to the site of involvement: ileocolic (9 patients), small bowel only (3 patients), and large bowel onl
(1 patient). Eight patients had surgical resectio
six of whom had ileocolic involvement. The most commonly performed operation was ileocolic resecti
with ileo-ascending colostomy (75%). The chief indication for surgery was acute abdomen (62%); two of these patients had a preoperative diagnosis of intestinal obstruction, and three had a preoper
tive diagnosis of appendicitis. Intestinal fistul
was diagnosed in two patients and tubo-ovarian abscess in one. When this series was compared to previously reported series of white patients, ther
were more females and more ileocolic involvement among the predominantly black population. In most other series, the greatest involvement occurred in the ileum alone. Crohn's disease seems to occur in blacks much less frequently than in whites.

5259 INSIGHT INTO CROHN'S DISEASE. (Fre.)

Geffroy, Y.; Hecketsweiler, P. (Centre Hospitalier Regional, 1, rue de Germont, F 76000 Rouen, France). *Rev. Rhum. Mal. Osteoartic.* 43(11
645-650; 1976.

5260 CROHN'S DISEASE OF THE COLON: ANATOMO-RADIOLOGICAL CORRELATIONS. (Ita.)

De Florio, L.; Farrugia, F.; Boriani, F.; Vallania, G.
Lucchi, A. (Istituto di Radiologia dell'Universita,
9 via Massarenti, I-40138 Bologna, Italy). *Radiol.*
Med. (Torino) 62(9):577-586; 1976.

See also, 4718, 4719, 4866, 4892, 4900, 4926, 4958, 4962, 4969, 4970, 4971, 4972.

UMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism a Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal trac Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter	NADP	nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)	NADPH	reduced nicotinamide adenine dinucleotidephosphate
dl	deciliter	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	nm	nanometer(s)
ED_{50}	median effective dose(s)	Pa	ambient pressure
EDTA	ethylenediamine tetraacetic acid	PAS	periodic acid - Schiff
e.g.	for example	pg	picogram (10^{-12})
EEG	electroencephalogram	pgEq	picogram equivalent(s)
ESR	erythrocyte sedimentation rate	p.o.	orally
g	gram(s)	ppb	parts per billion
µg	microgram(s)	ppm	parts per million
Hz	Hertz	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes), red blood count
Ig	immunoglobulin(s)	resp.	respectively
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kcal	kilocalorie(s)	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	U	unit(s)
K_m	Michaelis constant	UV	ultraviolet
LD_{50}	median lethal dose(s)	V	volt
LDH	lactic acid dehydrogenase	WBC	white blood cells (leukocytes), white blood count
m	meter(s)	yr	year(s)
M	molar; mole(s)		
mM	millimolar; millimole(s)		
µM	micromolar; micromole(s)		
ma	milliampere(s)		
mCi, µCi	milli-, microcurie(s)		
mEq	milliequivalent(s)		
mg	milligram(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

261 A STUDY OF THE PROTEINS OF THE BRUSH BORDER OF CANINE ENTEROCYTES. (Fre.) Star- ta-Geribaldi, M.; Fehlmann, M.; Sudaka, P. (Faculte e Medecine, Universite de Nice, Chemin de Vallom- rose, F-06200, Nice, France). *Arch. Int. Physiol. iochim.* 85(2):245-254; 1977.

roteins of the brush borders of canine enterocytes ere examined by gel electrophoresis. Microvilli ere isolated from the dog jejunal and ileal entero- ytes by successive homogenization and ultracentrifu- ation. A final yield of 22% was obtained, and the urified fraction showed a 19-fold increase in sucrase ctivity over the starting material. After solu- ilization with 2% sodium dodecylsulphate, the roteins were analyzed by polyacrilamide gel elec- rophoresis. After electrophoretic separation, 21 rotein bands were obtained, with molecular weights anging from 15,000 to over 340,000. Most of the roteins had molecular weights over 70,000. Glyco- roteins were found in seven bands, with molecular eights of 150,000 to over 340,000. Identical ands were obtained from jejunal and ileal prepa- ations.

262 ELECTRON MICROSCOPIC STUDIES ON ENDOCRINE CELLS AND EXOCRINE CELLS IN GASTRIC MUCOSA F RATS. I. ENDOCRINE CELLS IN GASTRIC MUCOSA OF ASTING RATS. (Jpn.) Sano, M. (2nd Surgical Dept., yoto Univ., Kyoto, Japan). *Arch. Jpn. Chir.* 45(4): 43-264; 1976.

asal granulated (endocrine) cells in the gastric ucosa of rats were examined by light and electron icroscopy after a 48-hr fast. Oval or pyramidal lear cells containing cytoplasmic granules were asily distinguished from other epithelial cells sing toluidine blue stain. These cells appeared ainly in the deeper two-thirds of the pyloric gland nd in the basal area of the fundic gland. Electron icroscopy revealed a well-developed Golgi apparatus, ree ribosomes, rough endoplasmic reticulum, mito- hondria, centrioles, microfilaments, and character- stic secretory granules. Most endocrine cells of he pyloric gland were on the surface of the lumen f the gland with specific microvilli at their pexes, suggesting that these cells receive chemical timuli from the lumen. In the fundic gland, the ells were located near nerve endings, suggesting hat the fundic endocrine cells are regulated by ervous stimulation. The cells were classified ccording to their fine structures: types G, EC, , D_1, and IV in the pyloric glands, and ECL and in the fundic glands. G cells were the most numerous ells in the pyloric glands. The secretory granules 50-300 μm in diameter. The electron density of he G cell granules was usually low. EC cells ontained polymorphous secretory granules, which ere about 200 μm in diameter and of high electron ensity. The basal area of the D cells contained ound granules, about 150-200 μm in diameter. D_1 ells also contained round secretory cells, which were highly electron-dense. These cells contained well-developed microfilaments near the nucleus. IV cells contained a few cored-vesicular granules, about 250-500 μm in diameter. ECL cells were the predominant fundic endocrine cells, and they contained large (300-500 μm) granules of low electron density. A cells contained highly electron dense, round secretory granules (200-250 μm). It is concluded that the endocrine cells observed produce gastrointestinal hormones.

5263 ELECTRON MICROSCOPIC STUDIES ON ENDOCRINE CELLS AND EXOCRINE CELLS IN GASTRIC MUCOSA OF RATS. II. MORPHOLOGICAL CHANGES IN CHIEF CELLS AND PARIETAL CELLS AFTER FASTING, REFEEDING, AND ELECTRICAL VAGAL STIMULATION. (Jpn.) Sano, M. (Shizuoka City Hosp., 10-93, Otemachi, Shizuoka City, Japan). *Arch. Jpn. Chir.* 45(4):265-278; 1976.

The fine structural changes in the chief cells and parietal cells of the rat fundic mucosa were examined after fasting, refeeding, and electrical vagal stimulation. After fasting and subsequent refeeding, the number of zymogen granules in the chief cells decreased, the arrangement of rough endoplasmic reticulum became irregular, the Golgi apparatus enlarged, and progranules were observed near the enlarged Golgi apparatus. These results suggest that both secretion and synthesis of the zymogen granules in the chief cells are stimulated by refeeding. In the parietal cells, the microvilli of the cell surface and the intracellular canaliculi were increased and elongated, and the intracellular canalicular spaces were distended after refeeding. This result suggests that the plasmalemma of the parietal cell is related to the site of secretion and synthesis of HCl. Vacuole-like secretory granules and dilated irregular rough endoplasmic reticulum and Golgi apparatus were observed in the chief cells after electrical vagus stimulation. Increased and elongated microvilli in the distended intracellular canaliculi were observed in the parietal cells after electrical stimulation. The changes seen in both cell types following electrical stimulation were somewhat different from those seen after refeeding. The results suggest that electrical vagus stimulation damages the physiologic cycle of secretion and synthesis of zymogen granules in the chief cells and, possibly, of HCl in the parietal cells.

5264 THE ISOLATION AND CHARACTERIZATION OF A BILE DUCTULE CELL POPULATION FROM NORMAL AND BILE-DUCT LIGATED RAT LIVERS. (Eng.) Grant, A. G.; Billing, B. H. (St. George's Hosp. Medical Sch., Tooting, London, SW17 0QT, England). *Br. J. Exp. Pathol.* 58(3):301-310; 1977.

Bile ductule cells were partially separated from Kupffer and sinusoidal endothelial cells in a suspension of nonparenchymal cells. Bile duct ligation was performed so that a fourfold increase in the total number of nonparenchymal cells isolated from rat liver was attained and the proportions of both Kupffer and bile ductule cells were elevated. Rate zonal centrifugation through a Ficoll gradient partially separated the cells into two populations: small cells (4-6 μm in diameter), probably originating from the sinusoidal endothelium, and larger bile ductule and Kupffer cells (8-12 μm diameter). A more successful separation was achieved by isopycnic centrifugation through a linear metrizamide gradient. Bile duct ligation (14 days) altered the distribution of cells on the gradient, and the peak containing bile ductule and Kupffer cells partially subdivided into the separate cell types. Antiserum raised against the bile ductule fraction was shown to be compatible with that raised against common bile duct tissue. γ-Glutamyl transpeptidase and leucine aminopeptidase activity were preferentially located in the rate zonal fraction containing bile ductule cells. Their specific activity increased after bile duct ligation, as did that of β-glucuronidase, which was raised in all cells. This study shows that the number of bile ductule cells in the liver can be increased by bile duct obstruction, so that their isolation from other cell types becomes possible.

5265 ON MICROSTRUCTURES OF HUMAN PIGMENT GALLSTONES. (Eng.) Wosiewitz, U. (Institut fur Medizinische Physik der Universitat, D-4400 Munster, W. Germany). *Naturwissenschaften* 64(7):390-391; 1977.

The scanning electron microscope was used to study the structure of human pigment gallstones. Black pigment stones from the gallbladder appeared as compact, fine-grained, tarlike masses. The fracture surface of this material gave the appearance of stratification, although this is not the case. "Pure" pigment stones, obtained mainly from the bile ducts, had a different microstructure. These had a porous, spongy texture and were laminated.

5266 MAMMALIAN PANCREAS DEVELOPMENT: REGENERATION AND DIFFERENTIATION IN VITRO. (Eng.) Richardson, K. E. Y.; Spooner, B. S. (Div. Biology, Kansas State Univ., Manhattan, KS 66506). *Dev. Biol.* 58(2):402-420; 1977.

To investigate further the protodifferentiated state of mammalian pancreas development, the primitive guts from 9-day mouse embryos were cultured for 3 days, during which protodifferentiated dorsal pancreas formed, consisting of a neck region or duct that extended from the intestinal wall and terminated in a large bulb of tissue. The pancreas bulb was then removed, leaving only the duct. This day corresponded to day 12 of gestation. During 5 days of additional culture, 37 of 43 ducts regenerated a pancreas with an amylase specific activity equal to that of control pancreas (2.4 μg of maltose hydrate released/min/μg of protein at 37 C. Guts placed in culture at 12 days, with removal of the pancreas the same day, gave similar results. Other combinations of starting embryonic age plus culture time, prior to pancreas removal, totaling 12 or 13 days, also underwent regeneration. Only 1 of 18 pancreases regenerated from ducts equivalent to 14 days of gestation. Removal of the stomach, the intestine, and the ventral pancreas did not affect the ability of the dorsal pancreas to regenerate. However, removal of the duct at the presumptive intestinal wall did not result in regeneration. Regenerated pancreas differentiation was further confirmed by electron microscopic demonstration of zymogen granules in exocrine cells and of at least two types of secretory granules in endocrine cells. The results demonstrate that the protodifferentiated duct can regenerate a new pancreas, including both exocrine and endocrine tissue, and that the regenerated pancreas is not retarded in its development when compared with the control pancreas.

5267 IMMUNOHISTOCHEMICAL DIFFERENTIATION OF THE GLANDS IN THE GASTROESOPHAGEAL (G-E) REGION OF MAN [Abstract]. (Eng.) Weinstein, W. M.; Lechago, J.; Samloff, I. M.; Bowes, K. L. (UCLA Sch. Medicine, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1147; 1977.

5268 MORPHOLOGIC EVALUATION OF THE OPOSSUM LOWER ESOPHAGEAL SPHINCTER (LES) [Abstract]. (Eng.) Seelig, L. L., Jr.; Goyal, R. K. (Univ. Texas Health Science Center at Dallas, Dallas, TX). *Gastroenterology* 72(5, Part 2):1129; 1977.

5269 A COMPARISON OF THE EFFECTS OF β-ADRENERGIC OR CHOLINERGIC AGONISTS ON THE ULTRASTRUCTURE OF RAT PAROTID GLAND IN VITRO [Abstract]. (Eng.) Leslie, B. A.; Putney, J. W., Jr. (Wayne State Univ., Detroit, MI 48201). *Fed. Proc.* 36(3):457; 1977.

5270 SEPARATION OF INTESTINAL GOLGI MEMBRANE FORM LATERAL-BASAL AND BRUSH BORDER MEMBRANES: ADENYLATE CYCLASE CO-PURIFIES WITH GOLGI [Abstract]. (Eng.) Weiser, M. M.; Neumeier, M.; Quaroni, A.; Kirsch, K. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1148; 1977.

5271 JEJUNAL MORPHOLOGICAL CONSEQUENCES OF VEGETARIAN DIET IN HUMANS [Abstract]. (Eng.) Owen, R. L.; Brandborg, L. L. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1111; 1977.

5272 TWO NEW CELLS IN THE PANCREATIC ISLETS [Abstract]. (Eng.) Polak, J. M.; Buchan, A. M. J.; Timson, C. M.; Bloom, S. R.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5):A414-A415; 1977.

5273 MULTIPLE HORMONAL APUD CELLS [Abstract]. (Eng.) Polak, J. M.; Bloom, S. R.; Buchan, A. M. J.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5): 410; 1977.

5274 DISTRIBUTION OF ENKEPHALIN IN THE GUT AND BRAIN [Abstract]. (Eng.) Sullivan, S. N.; Bloom, S. R.; Polak, J. M. (Hammersmith Hosp., London, England). *Gut* 18(5):A410; 1977.

See also, 5291, 5328, 5348, 5349, 5380, 5400, 5428, 5439, 5440, 5455, 5459, 5460, 5464, 5487, 5469, 5472, 5473, 5483, 5487, 5519, 5758, 5759, 5861, 5862, 5921, 5938.

ABSORPTION - EXCRETION - TRANSPORT

5275 PERMEABILITY OF THE RABBIT COLON IN VITRO. (Eng.) Yorio, T.; Bentley, P. J. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Am. J. Physiol.* 232(1):F5-F9; 1977.

The use of rabbit descending colon in *in vitro* permeability studies was assessed, and the permeability properties of this tissue are described. *In vitro* everted sac or diaphragm preparations of New Zealand rabbit descending colons exhibited a transmural potential difference (PD) as high as 70 mV, a short-circuit current (SCC) of 100-150 μamp/cm^2, and a resistance of 300-500 ohms/cm^2. The descending colon maintained these functions for at least 3 hr. Amiloride (10^{-5} M) on the mucosal side of the colon abolished the PD and SCC in everted sac preparations; however, the SCC was restored when the drug was washed from tissue. At a concentration of 10^{-4} M, the effect of amiloride was not reversible. Amphotericin B (12.5 μg/ml) on the mucosal side of the colon stimulated the SCC, but had no significant effect on the PD. Measurements of the influx (mucosa to serosa) and efflux of sodium, chloride, and potassium across the colon (diaphragm preparations) under short-circuit conditions showed a net influx of sodium (3.3 μEq/cm^2/hr) and a net efflux of potassium (-0.34 μEq/cm^2/hr). The SCC could be accounted for by the movements of these ions. The SCC in the presence of 12.5 μg/ml amphotericin B on the mucosal side of the colon (118 microamp/cm^2) was nearly equivalent to the net sodium flux expressed as microamp/cm^2 (110). Amiloride (10^{-4} M) on the mucosal side of the colon abolished the net sodium transfer, but did not have a significant effect on the net flux of potassium. The permeability coefficient for water was 5,147 ± 688 cm/sec, while the permeability coefficient for urea was 26 ± 4.9 cm/sec. The restricted permeability of the rabbit colon to urea, which is much less than in its gallbladder (890 cm/sec), may reflect the excretory role of the colon. The rabbit's colon thus exhibits a diverse permeability to different molecules, and this appears to be consistent with its physiological functions.

5276 MEASUREMENTS OF INTESTINAL PERMEABILITY USING LOW MOLECULAR WEIGHT POLYETHYLENE GLYCOLS (PEG 400): I. CHEMICAL ANALYSIS AND BIOLOGICAL PROPERTIES OF PEG 400. (Eng.) Chadwick, V. S.; Phillips, S. F.; Hofmann, A. F. (Royal Postgraduate Medical Sch., London W12, England). *Gastroenterology* 73(2):241-246; 1977.

The use of a polyethylene glycol complex with an average molecular weight of 400 (PEG 400) for the measurement of intestinal permeability in man is discussed. PEG 400 contains at least nine distinct water-soluble polymeric units with molecular weights ranging from 242-594 daltons. The water-soluble molecules of PEG 400 can be readily extracted from biological fluids and analyzed by gas-liquid chromatography. Experiments involving the i.v. administration of PEG 400 to animals and the p.o administration of PEG 400 to humans indicate that PEG 400 is not toxic, is not degraded by intestinal bacteria, is not metabolized after absorption, and is rapidly excreted in the urine. The percentage absorption of each molecular weight component of PEG 400 was assessed by urinary recovery over 6 hr after p.o. administration (10.0 g) to 10 fasting normal control subjects. Percentage absorption was relatively constant for the four smallest molecular species of PEG 400 (molecular weight, 242-374) and thereafter was inversely proportional to molecular size. The relative absorption of the different molecules was dependent on intestinal permeability alone; thus, a comparison of ratios of the absorption of different molecular weights can be used as a reliable index of permeability. Absorption of PEG 400 was not influenced by the taking of a liquid test meal with a PEG 400 dose of 10 g, p.o. Since PEG 400 is relatively inert chemically and is resistant to bacterial degradation, it is particularly suitable for use in man and allows for studies of permeability in bacterially contaminated regions of the intestine. The absence of tissue metabolism and the rapid urinary excretion of PEG 400 after absorption (56.6 ± 5.8% of the dose is excreted over 48 hr in man) allow for the assessment of intestinal absorption on the basis of urinary excretion either after p.o. administration or when PEG 400 is infused through a tube at different levels in the intestine.

5277 MEASUREMENTS OF INTESTINAL PERMEABILITY USING LOW MOLECULAR WEIGHT POLYETHYLENE GLYCOLS (PEG 400): II. APPLICATION TO NORMAL AND ABNORMAL PERMEABILITY STATES IN MAN AND ANIMALS.

(Eng.) Chadwick, V. S.; Phillips, S. F.; Hofmann, A. F. (Royal Postgraduate Medical Sch., London W12, England). *Gastroenterology* 73(2):247-251; 1977.

A low molecular weight polyethylene glycol complex (PEG 400) was used to study the normal and abnormal permeability states in man and animals. Permeability measurements were made after direct infusions of 10 g of PEG 400 via an intestinal tube into the proximal jejunum, ileum, or cecum of normal human subjects. Absorption of the individual molecular weight components of PEG 400, expressed as a percentage of the dose recovered in the urine over 6 hr, was inversely proportional to molecular weight for each region of the intestine. Steady state regional perfusion studies with five normal volunteers were performed, with permeability being measured during net fluid absorption in four subjects and during net secretion (induced with hyperosmolar saline perfusion) in the fifth subject. In spite of the reversed solvent flow, the PEG 400 permeability profile was not significantly different under these two conditions, suggesting that the permeability technique can be used in absorptive or secretory states. In another study with five normal subjects, PEG 400 absorption increased markedly during the perfusion of 5 mM chenodeoxycholate. The effect of 5 mM taurocholate on the function of Heidenhain pouches in four dogs was studied to assess the effect of bile acids on gastric mucosal permeability. Volume secretion into the pouch decreased from 9.98 ± 5.25 ml/hr in the absence of bile acid to 2.98 ± 2.92 ml/hr in the presence of bile acid. Hydrogen ion secretion into the pouch similarly decreased from a pretreatment value of 0.523 ± 0.37 mEq/hr to 0.286 ± 0.35 mEq/hr after taurocholate treatment. The final pH of the perfusate was 1.95 in taurocholate experiments, compared with 1.45 during control periods. This impairment of function of the pouches was associated with a marked increase in mucosal permeability to all of the molecular components of PEG 400. Permeability studies with celiac sprue patients showed that patients responding poorly to treatment showed decreased permeability to p.o. administered PEG 400 (10.0 g) in comparison with normal volunteers. Celiac sprue patients responding to treatment with a more than 5% weight gain showed intermediate permeability profiles compared with poor responders and normal volunteers. These studies illustrate the potential of the permeability measurement technique for studying the function of diseased intestine in man.

5278 DERIVATION OF THE EQUATIONS THAT DESCRIBE THE EFFECTS OF UNSTIRRED WATER LAYERS ON THE KINETIC PARAMETERS OF ACTIVE TRANSPORT PROCESSES IN THE INTESTINE.

(Eng.) Thomson, A. B. R.; Dietschy, J. M. (Dept. Medicine, 9-112 Clinical Science Building, Univ. Alberta, Edmonton, Alberta T6G 2G3, Canada). *J. Theor. Biol.* 64(2):277-294; 1977.

An equation that describes the velocity of active transport in the intestine as a function of the characteristics of both the transport carrier in the membrane of the epithelial cell and the resistance of the overlying unstirred water layer is presented. Using this equation, a series of curves are presented that depict the effect of varying the thickness or surface area of the unstirred water layer, the free diffusion coefficient of the solute, the distribution of active transport sites along the villus, the maximal transport velocity, and the true Km on the kinetics of active transport. These theoretical curves illustrate serious limitations inherent in the interpretation of previously published data dealing with active transport processes in the intestine. For example, experimentally determined Km values for the transport of a given solute commonly vary significantly when measured in different kinds of *in vitro* preparations and are usually many times higher when measured by perfusion techniques *in vivo*. In view of the marked effect of unstirred water layer resistance on Km values, it is very likely that these observed differences primarily reflect differences in unstirred water layer resistance in these different preparations and not the binding characteristics of the membrane carrier. Since none of the equations describing active transport in the presence of significant unstirred layer resistance take the form of a rectangular hyperbole, the appli cation of the Michaelis-Menten equations with the use of reciprocal plots to derive values for Km an the true maximal transport rate (J^m) is not only theoretically incorrect, but also introduces error in the determination of Km and J^m. It is no longe tenable, therefore, to continue to use such reciprocal plots for the analysis of intestinal tran port data.

5279 EPITHELIAL CELL EXTRUSION DURING FLUID TRANSPORT IN CANINE SMALL INTESTINE.

(Eng.) Lee, J. S. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Am. J. Physiol.* 232(4): E408-E414; 1977.

Epithelial cell extrusion during fluid transport i the canine small intestine was studied under both *in vitro* and *in vivo* conditions. Cell extrusion times for villus tips *in vitro* from membranes of dogs with low (183 ± 25 µl/cm^2/hr) and high (485 ± 30 µl/cm^2/hr) fluid absorption rates were always much shorter in the villi with obstruction of lymp flow (43 ± 4 min and 20 ± 6 min, resp.) than in those with free flow of lymph (33 ± 4 and 11 ± 3 min, resp.). In the villi with obstruction of lym flow, the mean lymph pressure of 31 jejunal villi of nine dogs was 4.5 ± 0.3 mm Hg and that of 30 ileal villi was 2.6 ± 0.2 mm Hg. When the lymph pressure in the jejunal and ileal villi was increa to 6.4 ± 0.2 and 12.3 ± 0.5 mm Hg, resp., by the injection of Ringer solution into the central lacteals, fluid leaked out of the villi and a shed ding of epithelium occurred. Vigorous villus spas modic contraction induced by cocaine (5-10 mM) or atropine (10 mM) also caused a shedding of epithelium. *In vivo*, cells always appeared in the lume of the intestine either during fluid absorption o secretion. A copious secretion of fluid, an

ncrease in cell loss, and congestion of blood in
he villi occurred in villi exposed to isotonic
olutions of magnesium sulfate and choline chloride
r as a result of the action of cholera toxin.
he rate of cell loss was highest during fluid
ecretion induced by an elevation of tissue fluid
ressure during such conditions as high venous
ressure or intra-arterial histamine infusion.
fter intra-arterial histamine infusion for 20 min,
luid secretion rate was measured at 12.9 ± 3.5 ml/
0 min and cell loss at 130 ± 62 x 10^6, or 48-fold
f that when luminal fluid was isotonic sodium
hloride (NaCl) solution. In the jejunal segment,
ppreciable fluid secretion was obtained when the
enous pressure was increased to 40 mm Hg. Fluid
ecretion rate was 3.7 ± 0.4 ml/20 min, and cell
oss was 1,100 ± 480 x 10^6, or more than 400-fold
f that with isotonic NaCl solution. It is thus
oncluded that elevated tissue fluid pressure is
nvolved in epithelial cell extrusion during fluid
ransport in the canine small intestine.

280 INTESTINAL ABSORPTION OF α-TOCOPHEROL IN THE UNANESTHETIZED RAT. THE INFLUENCE OF UMINAL CONSTITUENTS ON THE ABSORPTIVE PROCESS.

Eng.) Muralidhara, K. S.; Hollander, D. (Div.
astroenterology, Wayne State Univ. and Harper
osp., Detroit, MI 48201). *J. Lab. Clin. Med.*
0(1):85-91; 1977.

H-α-tocopherol intestinal absorption was studied
n unanesthetized male Sprague-Dawley rats. The
ate of absorption of α-tocopherol was measured at
erfusate concentrations ranging from 4 nM to 500 μM,
ith the infusate consisting of 10 mM of sodium
aurocholate, 2.5 mM oleic acid, and 2.5 mM mono-
lein micellarized in phosphate buffer at pH 7.4.
he rate of α-tocopherol absorption was linear over
he concentration range. Increasing the sodium
aurocholate concentration to 20 mM in an infusate
omposed of phosphate buffer at pH 7.4 and α-toco-
herol (200 μM) significantly ($p<0.05$) increased
he rate of α-tocopherol absorption from 13.3 ± 0.24
mol/min/10 cm intestine (at 10 mM taurocholate)
o 15.6 ± 0.25 nmol/min/10 cm intestine. The addi-
ion of 2.5 mM saturated and unsaturated long-chain
atty acids to an infusate composed of 10 mM tauro-
holate and 200 μM α-tocopherol significantly
p<0.05) decreased the rate of α-tocopherol absorp-
ion. The most marked decrease in absorption of the
itamin occurred after the addition of 2.5 mM of
he polyunsaturated linolenic acid to the infusate,
ith α-tocopherol absorption decreasing from 13.3 ±
.24 nmol/min/10 cm (no fatty acid was added to the
nfusate) to 8.5 ± 0.52 nmol/min/10 cm when lino-
enic acid was added ($p<0.01$). A progressive
nhibition of α-tocopherol absorption was observed
s the concentration of linolenic acid was increased.
aising the perfusate pH from 4.3 to 8.0 (perfusate
omposed of 200 μM α-tocopherol and 10 mM tauro-
holate micellarized in phosphate buffer) resulted
n a progressive decrease in α-tocopherol absorption
rom 26.3 ± 1.56 to 7.2 ± 0.35 nmol/min/10 cm
p<0.01). These experiments indicate that micellar
xpansion with polyunsaturated fatty acids inter-
eres with the absorption of α-tocopherol and may
esult in a deficiency of the vitamin.

5281 AMINO ACID CONCENTRATIONS IN PORTAL VENOUS PLASMA DURING ABSORPTION FROM THE SMALL INTESTINE OF THE GUINEA PIG OF AN AMINO ACID MIXTURE SIMULATING CASEIN AND A PARTIAL ENZYMIC HYDROLYSATE OF CASEIN.

(Eng.) Sleisenger, M. H.; Pelling, D.; Burston, D.; Matthews, D. M. (Dept. Medicine, Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Clin. Sci. Mol. Med.* 52(3):259-267; 1977.

Ion exchange chromatography was used to investigate amino acid concentrations in the portal venous plasma of female Dunkin Hartley guinea pigs at 5-, 10-, 15-, 20-, 30-, 40-, 50-, and 60-min intervals after infusion into the duodenum of equivalent amounts of an amino acid mixture simulating casein or a partial enzymic hydrolysate of casein. The partial hydrolysate of casein was prepared by hydrolysis with papain followed by hydrolysis with pig-kidney peptidases. For some amino acids such as leucine, isoleucine, valine, phenylalanine, and lysine, the curves for portal plasma amino acid concentration versus time were similar after enzyme hydrolysate or amino acid mixture infusion, although they were usually lower for enzyme hydrolysate treatment. With other amino acids, the curves after enzymic hydrolysate infusion were very much lower than the corresponding curves after amino acid mixture infusion, particularly in the cases of serine, glutamine, proline, and glycine. Portal plasma concentrations of glutamine were significantly lower at 20, 30, and 40 min ($p<0.05$) after enzyme hydrolysate treatment, being -4 ± 7, -5 ± 12, and 1 ± 5 μM, resp., compared with values of 4 ± 4, 12 ± 6, and 12 ± 8 μM, resp., after amino acid treatment. The same was true for serine at 20 min ($p<0.02$), 30 min ($p<0.01$), and 40 min ($p<0.01$) after treatment, with the respective values after enzyme hydrolysate treatment being 122 ± 20, 202 ± 34, and 174 ± 43 μM, compared with values of 259 ± 44, 415 ± 43, and 413 ± 60 μM, resp., after amino acid mixture infusion. For glycine and proline, the portal plasma levels at 30 min after treatment were significantly lower after enzyme hydrolysate treatment, being 1 ± 54 ($p<0.05$) and 326 ± 56 μM ($0.1>p>0.05$), resp., compared with values of 215 ± 66 and 529 ± 96 μM, resp., after amino acid mixture treatment. Similar significant differences were noted for methionine at 10 min post-treatment ($p<0.01$) and for histidine at 40 min after treatment ($p<0.05$). The results can be partially explained by the hypothesis that the lower amino acid concentrations in portal plasma after enzymic hydrolysate treatment are the result of entry of amino acids into the portal blood in a peptide form not detectable by the analytical technique employed. The data may also be possibly explained by a more rapid clearance of amino acids from the blood during absorption of the enzymic hydrolysate.

5282 RESPONSES TO ETHANOL IN RAT STOMACH.

(Eng.) Sernka, T. J.; Jackson, A. F. (Louisiana State Univ. Medical Center, Shreveport, LA 71130). *Nutr. Rep. Int.* 14(4):415-421; 1976.

Ethanol absorption and its effect on gastric acid secretion were studied to serve as a base of comparison for other hyperosmotic gastric effects that have been reported in the rat. The stomachs of rats were successively instilled with isosmotic ethanol solution (1.63%, v/v; 277 ± 4 mOsmol/kg), threefold hyperosmotic ethanol solution (5.24%, v/v; 922 ± 9 mOsmol/kg), and sixfold hyperosmotic ethanol solution (10.5%, v/v; 1,940 ± 7 mOsmol/kg). A rapid rate of ethanol absorption that was linearly related to the instilled concentration was seen. The fraction of ethanol absorbed per half-hour was 28% from 1.63% ethanol; 36% from 5.24% ethanol, and 41% from 10.5% ethanol. Ethanol exerted effects on the gastric mucosa only at about twice the hyperosmolality of the other less lipid soluble instillates (NaCl, KCl, $MgCl_2$, or dextrose), presumably due to its relatively unrestricted absorption. Acid secretion was inhibited (at the 10.5% ethanol concentration; the H^+ concentration was 0.0 mEq/l), and the electrical potential difference across the stomach wall was depressed only at the highest concentration of ethanol tested (1,900 mOsmol/kg). Ethanol is reported to produce the same changes in gastric mucosal function as other hyperosmotic agents when instilled into the rat stomach. Due to its lipid solubility, ethanol can rapidly permeate the lipoid matrix of the gastric mucosa and be absorbed, even at low concentrations.

5283 THE TRANSFER OF VOLATILE FATTY ACIDS THROUGH THE WALL OF ISOLATED RAT CECUM. (Fre.) Mottaz, P.; Worbe, J. F. (Laboratoire de Physiologie metabolique, Universite de Lyon I, 43, boulevard du 11 Novembre 1918, 69621 Villeurbanne, France). *C. R. Soc. Biol. (Paris)* 171(2):375-380; 1977.

The transfer of acetic (60 mM), propionic (25 mM), and butyric (15 mM) acids through the cecum was studied *in vitro* in male Wistar rats using an everted sac technique. The quantities of volatile fatty acids (VFA) found in the mucosal and serosal fluids and in the cecal wall were measured chromatographically 1 hr after the acids were introduced to either side of the cecal wall. The results showed that the cecum, unlike the duodenum, was not able to transport VFA from the mucosal to the serosal side against a concentration gradient. It is concluded that the cecal membrane is permeable to VFA and that diffusion solely accounts for the observed transfers.

5284 HUMAN INTESTINAL ION TRANSPORT IN VITRO. (Eng.) Corbett, C. L.; Isaacs, P. E. T.; Riley, A. K.; Turnberg, L. A. (Univ. Manchester Sch. Medicine, Eccles Old Rd., Salford M6 8HD, England). *Gut* 18(2):136-140; 1977.

The transport of sodium and chloride across human jejunal and ileal mucosa was studied *in vitro*. Specimens of mucosa obtained from patients undergoing small bowel resection were stripped of muscle coats, mounted in specially designed Perspex flux chambers, and were bathed in warmed, oxygenated, and stirred buffer solutions. In both jejunum and ileum specimens, there was a significant ($p<0.05$) net absorption of sodium in glucose-free solutions (+1.3 ± 0.4 and +1.2 ± 0.5 µmol/hr/cm^2, resp.). There was a small net secretion of chloride in the jejunum and ileum (-1.8 ± 0.9 and -0.4 ± 0.6 µmol/hr/cm^2, resp.) with neither value being significantly different from zero. Glucose increased net sodium absorption in the jejunum (+5.9 ± 1.2 µmol/hr/cm^2, $p<0.02$) and ileum (+12.1 ± 1.4 µmol/hr/cm^2, $p<0.001$) mainly because of an increase in the mucosa to serosa unidirectional flux. Ileal unidirectional chloride fluxes were not significantly altered by glucose, although net chloride absorption (+1.6 ± 0.7 µmol/hr/cm^2) was significantly greater than zero ($p<0.05$) In the jejunum, the net chloride absorption was unchanged by glucose addition. In the absence of glucose, the potential difference (PD), short circuit current (SCC), and resistance (R) values were 5.6 ± 0.4 mV, 70.6 ± 4.3 µamp/cm^2, and 82.6 ± 5.8 ohms/cm^2, resp., in the jejunum and 3.3 ± 0.3 mV, 89.9 ± 6.1 µamp/cm^2, and 40.3 ± 2.8 ohms/cm^2, resp. in the ileum. After glucose addition, the PD, SCC, and R values were 7.7 ± 0.3 mV, 181.9 ± 12.2 µamp/cm^2, and 52.7 ± 4.3 ohms/cm^2, resp., in the jejunum and 8.4 ± 0.4 mV, 252 ± 15.8 µamp/cm^2, and 36.5 ± 1.6 ohms/cm^2, resp., in the ileum. Thus, in both j junum and ileum, glucose enhanced PD and SCC ($p<0.001$). Ileal resistance was unaffected, but in th jejunum, the resistance was lowered by glucose ($p<0.001$). The results are broadly similar to those reported for *in vitro* animal intestine experiments, but they differ from those obtained *in vivo* in man and animals, suggesting that technical rather than species differences are responsible for many of the discrepancies between *in vivo* human and *in vitro* animal intestinal behavior.

5285 ION TRANSPORT ACROSS ISOLATED ANTRAL MUCOSA OF THE RABBIT. (Eng.) Fromm, D.; Schwartz, J. H.; Roberston, R.; Fuhro, R. (Harvard Medical Sch., Boston, MA 02215). *Am. J. Physiol.* 231(6):1783-1789; 1976.

The transport of sodium, potassium, chloride, and bicarbonate across isolated antral mucosa of New Zealand white rabbits under short-circuit condition was studied. Net fluxes (unidirectional mucosal-to serosal flux minus unidirectional serosal-to-mucosa flux) of sodium, chloride, and potassium ion were -1.3 ± 0.1, -4.0 ± 0.3, and 0.1 ± 0.3 µEq/hr/cm^2, resp., across antral mucosa bathed in bicarbonate-free Ringer solution and -1.5 ± 0.2, -3.0 ± 0.4, an 1.1 ± 0.4 µEq/hr/cm^2, resp., when both sides of antral mucosa were bathed in Ringer solution containing bicarbonate. In contrast to flux measurements made in the absence of bicarbonate, a significant ($p<0.025$) residual flux was observed in the presence of bicarbonate, suggesting the presence o bicarbonate secretion. The addition of bicarbonate to 12 tissues was followed by a significant increas ($p<0.001$) in the unidirectional mucosal-to-serosal chloride flux, with the mean difference between thi flux before and after bicarbonate addition to serosal bathing solution being 1.87 ± 0.27 µEq/hr/cm^2. In contrast, the unidirectional serosal-to-mucosal flux, chloride flux, or either of the unidirectional sodium fluxes was not significantly tered after bicarbonate addition. Measurent of bicarbonate secretion in the absence of bient chloride ion suggests that a major portion the bicarbonate flux is not dependent on chlore. However, the presence of luminal chloride ion rther stimulated bicarbonate secretion, and birbonate secretion increased the unidirectional cosal-to-serosal flux of chloride. Hence, there both a chloride-independent and a chloridependent component of bicarbonate secretion by bbit antrum. In the absence of ambient chloride n, norepinephrine did not significantly alter carbonate secretion, suggesting that an observed repinephrine-induced reduction in bicarbonate cretion in the presence of chloride ion may be e to inhibition of that fraction of bicarbonate cretion dependent on unidirectional chloride ion ansport.

36 EFFECT OF HYPERMAGNESEMIA ON RAT JEJUNAL SODIUM AND WATER TRANSPORT.

(Eng.) Bona, G. F.; Sawin, L. L. (Univ. Iowa Coll. Medine, Iowa City, IA 52242). *Am. J. Physiol.* 231(6): 71-1776; 1976.

e effect of hypermagnesemia on sodium and water ansport in *in vivo* perfused jejunums of female ague-Dawley rats was investigated. The jejunal gments were perfused with a sustaining infusion ntaining 80 mM magnesium chloride. During 14 eximents, when the plasma magnesium concentration s increased threefold from a control value of 78 ± .16 mEq/1 to 5.89 ± .55 mEq/1 ($p<0.01$), the water flux decreased from a control value of .9 ± 6.1 µl/hr/cm to 38.8 ± 4.6 µl/hr/cm ($p<0.01$), l the net sodium flux decreased from a control lue of 7.9 ± 0.9 mEq/hr/cm to 5.6 ± 0.7 mEq/hr/ ($p<0.01$). Measurements of the unidirectional ux of sodium from blood to lumen and from lumen blood indicated that the above decreases were e to a reduction in unidirectional sodium efflux om lumen to blood and not to an increase in uniectional sodium influx from blood to lumen. ing experiments in which the plasma magnesium ncentration was increased threefold from 1.74 ± 3 mEq/1 to 5.66 ± 41 mEq/1, hypermagnesemia did change the jejunal permeability to inulin 0.2). The effect of hypermagnesemia on jejunal lium and water transport is similar to that on nal proximal tubule sodium and water transport, l this similarity suggests that the mechanism of ion of magnesium on these two transporting epielial tissues is similar.

37 CALCIUM TRANSLOCATION BY GOLGI AND LATERAL-BASAL MEMBRANE VESICLES FROM RAT ESTINE: DECREASE IN VITAMIN D-DEFICIENT RATS.

ng.) Freedman, R. A.; Weiser, M. M.; Isselbacher, J. (Massachusetts General Hosp., Boston, MA 114). *Proc. Natl. Acad. Sci. U.S.A.* 74(8):3612-16; 1977.

estinal Ca^{2+} transport was studied in membrane sicles isolated from microvillus, Golgi, and eral-basal membrane preparations of rats. Ca^{2+} take by these vesicles was measured by determination of ^{45}Ca^{2+} associated with these membranes after collection by micropore filtration. Golgi membranes showed the highest initial rate and equilibration level of Ca^{2+} uptake. Approximately 90% of this Ca^{2+} uptake was into an osmotically responsive space, suggesting that what was measured was predominantly Ca^{2+} translocation. Vitamin D-deficient rats (rats fed a 0.02% calcium, 0% vitamin D diet for 2-3 weeks) showed a markedly diminished rate of uptake and level of equilibration. These data indicate that a Ca^{2+}-translocating process was associated with Golgi membranes to a greater extent than with surface membranes and that this process was markedly decreased in vitamin D-deficient rats. The results suggest that the Golgi apparatus participates in intestinal Ca^{2+} absorption.

5288 FAILURE OF LACTOSE AND GLUCOSE TO INFLUENCE IN VIVO INTESTINAL CALCIUM TRANSPORT IN NORMAL RATS.

(Eng.) Urban, E.; Pena, M. (Audie L. Murphy Veterans Admin. Hosp., 7400 Merton Minter Blvd., San Antonio, TX 78284). *Digestion* 15(1): 18-27; 1977.

The influence of luminal lactose and glucose on intestinal calcium transport was examined *in vivo* in normal post-weaned young Sprague-Dawley rats. *In situ* segments of duodenum, midgut, and ileum were perfused through the lumen for 1 hr with an isotonic solution of 3.4 mM calcium containing radioactive ^{45}calcium as tracer plus either 10 mM lactose or 10 mM glucose or, for control rats, no saccharide. Net absorption was measured by the disappearance of luminal calcium, and lumen-to-plasma (LP) flux was determined from the disappearance of calcium tracer. The plasma-to-lumen (PL) flux, which is the most subject to error of any of the transport measurements, was calculated by subtracting calcium absorption/g from LP flux/g. Control rats had PL flux/g values for the duodenum, midgut, and ileum of 22.8 ± 4.7, 9.9 ± 2.8, and 8.4 ± 2.4, resp., compared with corresponding values of 19.3 ± 4.7, 7.8 ± 2.7, and 10.8 ± 4.0, resp., for lactose-perfused rats and values of 23.2 ± 3.7, 6.1 ± 1.2, and 7.3 ± 2.8, resp., for glucose-perfused rats. The data indicate that luminal lactose or glucose had no direct effect on calcium transport under the above steady-state conditions.

5289 LIPID ABSORPTION IN NEWBORN RAT INTESTINE.

(Eng.) Ferlatte, M. I.; Zeman, F. J. (Dept. Nutrition, Univ. California, Davis, CA 95616). *Dev. Biol.* 57(1):1-14; 1977.

Lipid absorption by intestinal cells of the proximal small intestine of newborn Sprague-Dawley rats weighing 6.4 ± 0.3 g was studied to characterize the function and morphology of transition cells. Three groups of rats were used: unsuckled animals, suckled animals, and unsuckled animals infused with 0.1 ml of corn oil. Three distinct regions of cellular maturation within the newborn intestinal epithelium were found. As crypt cells move onto the lower villus surface, they become transition cells, which in turn were reported to differentiate into mature villus-absorptive cells. Crypt cells were capable of mitosis and of some absorption, whereas villus cells were capable only of absorption (after 3 hr of infusion they were filled with lipid droplets). Transition cells were capable of both division and absorption (a large number of lipid droplets were seen). It is suggested that intestinal cells of newborn rats retain their ability to divide while their capacity to absorb and transport nutrients increases. Rough endoplasmic reticulum plays an important role in the transport of lipid through these cells.

5290 TRANSPORT OF PURINE NUCLEOTIDES AND NUCLEOSIDES BY IN VITRO RABBIT ILEUM.

(Eng.) Harms, V.; Stirling, C. E. (Dept. Medicine, Univ. California, San Diego, CA 92093). *Am. J. Physiol.* 233(1):E47-E55; 1977.

To obtain a better understanding of the mechanism of purine absorption and to gain further insight into the effects of exogenous ATP on transport, the kinetics of $[^{14}C]$ATP and $[^{14}C]$adenosine entry into rabbit ileum were measured using 1-min mucosal exposures. ATP influx was the sum of a linear ($p = 1.02 \times 10^{-3}$ cm/min, where P is the permeability coefficient of the pathway) and nonlinear component (J_m=4.07 nmol/min/cm^2, K_m=0.31 mM, where J_m is the maximum influx). Adenosine yielded quantitatively similar results. The kinetics of $[\gamma\text{-}^{32}P]$ATP entry were only linear ($p = 0.55 \times 10^{-3}$ cm/min). These data indicate that at least 85% of the terminal phosphate of ATP is hydrolyzed during transport. Inhibitory measurements indicate that ring-labeled ATP and adenosine compete for a common entry path; however, adenosine does not inhibit the saturable component of $[^{14}C]$ATP to the degree expected of a simple carrier-mediated system. Adenosine (5 mM) produced no inhibition of $[\gamma\text{-}^{32}P]$ATP (0.1-1.0 mM) entry. Measurement of hydrolysis during incubation indicates a negligible fraction of uptake results from labeled adenosine released into the bulk solution. Hydrolysis of ATP followed by a preferred uptake of the adenosine released at the membrane surface probably accounts for most of the observed transport. $[^{14}C]$ATP entry depended neither on $[Na^+]$, $[Mg^{2+}]$, nor $[Ca^{2+}]$ of the bulk solution. Autoradiography of $[^3H]$ATP confirmed that the labeled material entered the epithelial cells and that uptake was nonuniform among cells.

5291 AN ELECTRON MICROSCOPE STUDY OF THE INTESTINAL ABSORPTION OF MEDIUM CHAIN AND LONG CHAIN TRIGLYCERIDES IN THE RAT.

(Eng.) Ohshima, Y. (Kyushu Univ. Faculty Medicine, 3-1-1 Maedashi, Higashi-ku, Fukuoka, 812 Japan). *Arch. Histol. Jpn.* 40(2):153-169; 1977.

Light and electron microscopic studies of ultrastructural changes in the intestinal absorptive cells of Wistar rats fed medium chain (MCT, trioctanoin) or long chain (LCT, soybean oil) triglycerides are reported. In the absorptive cells of rats fed MCT, the agranular endoplasmic reticulum in tubular form was remarkably proliferated throughout the cytoplasm, compared with that of fasting rats. The granular endoplasmic reticulum was mostly transformed into the same tubulo-vesicular form as the agranular endoplasmic reticulum. Chylomicrons, whic were consistently observed in the endoplasmic reticulum of the intestinal absorptive cells of rats fed LCT, did not appear in MCT-fed rats, although small lipid particles were noticed within the endoplasmic reticulum. In rats fed MCT, the Golgi complex was usually located at the supra and lateral nuclear zone of the cytoplasm. The Golgi lamellae were shorter in length and decreased in number. In LCT-fed rats, the Golgi lamellae became reduced in number and length during the early stage of LCT absorption. As absorption progressed, the Golgi lamellae almost completely disappeared, and Golgi vacuoles that were filled with lipid droplets were conspicuous. During the absorption of MCT, the central lacteal contained a few lipid particles, which were smaller in size than the chylomicron observed in the central lacteal during LCT absorption. These observations suggest the possibility that the majority of MCT administered was transported through the absorptive cell into the portal venous system without reesterification in the endoplasmic reticulum and that only a minor part of the MCT administered was transported via the central lacteal after reesterification.

5292 ZINC-BINDING LIGANDS IN MILK AND INTESTIN A ROLE IN NEONATAL NUTRITION?

(Eng.) Hurley, L. S.; Duncan, J. R.; Sloan, M. V.; Eckhert C. D. (Dept. Nutrition, Univ. California, Davis, Davis, CA 95616). *Proc. Natl. Acad. Sci. U.S.A.* 74(8):3547-3549; 1977.

The hypothesis that a zinc-binding ligand (ZBL) recently discovered in human milk but absent from cow's milk might be related to zinc nutrition in the neonate was investigated using the Sprague-Dawley rat as a model. By gel filtration, rat milk was found to contain a ZBL with characteristics similar to those of the ZBL found in human milk. A similar ZBL was identified in the intestinal mucosa of rats 16 days of age and older but was absent in rats from birth to 16 days. These results support the hypothesis that the ZBL of maternal milk may enhance zinc transport in the neonatal period before the development of intestinal mechanisms for zinc absorption.

5293 THE MECHANISM FOR SMALL-BOWEL ADAPTATION IN LACTATING RATS.

(Eng.) Elias, E.; Dowling, R. H. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Clin. Sci. Mol. Med.* 51(5): 427-433; 1976.

To study the relative contributions of luminal nutrition, bile and pancreatic secretions, and hormonal factors in intestinal adaptation, lactation hyperphagia was chosen as a model for increased lum inal nutrition, either alone (intestinal transectio control group) or in combination with (I) exclusion of bile and pancreatic secretions from the jejunum (by transposition of the jejunum above the Ampulla of Vater) or (II) exclusion of bile, pancreatic secretions and exogenous luminal nutrition from the

junum (proximal Thiry-Vella by-pass group). Mu-
sal hyperplasia was reported in lactation. The
an villus height increased from 393 ± 24 μm in
e nonlactating control jejunum to 460-509 μm in
e different groups of lactating rats. Similar
sults were seen in jejunum for crypt depth, which
creased by 50, 56, and 39% in the transected
<0.005), duodenal transposition ($p<0.001$), and by-
ss ($p<0.01$) groups, resp. Comparable increases
re reported in the ileum of various groups of
ts. The mean glucose absorption from nonlactat-
g control jejunum (1.98 ± 0.09 mg/hr/cm) in-
eased by 58% in lactating transected control rats,
44% in the duodenal transposition group, and by
% in the by-pass group ($p<0.001$). These struc-
ral and functional adaptive changes were much
eater in ileum than in jejunum. The magnitude
the increased absorption was similar in all
oups of lactating rats, whether or not pancrea-
co-biliary secretions had been excluded from the
junum or diverted to the ileum. It is suggested
at the changes in small bowel mucosal structure
d function seen in lactation in the rat are due
hormonal factors.

94 EXPERIMENTAL DIABETES REDUCES CIRCULATING
1,25-DIHYDROXYVITAMIN D IN THE RAT. (Eng.)
hneider, L. E.; Schedl, H. P.; McCain, T.; Haussler,
R. (Dept. Medicine, Univ. Iowa, Iowa City, IA
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95 A POTASSIUM GRADIENT IN SMOOTH MUSCLE
SEGMENT OF THE OPOSSUM ESOPHAGUS. (Eng.)
hulze, K.; Conklin, J. L.; Christensen, J. (Univ.
wa Coll. Medicine, Iowa City, IA 52242). *Am. J.
ysiol.* 232(3):E270-E273; 1977.

96 INTESTINAL ABSORPTION OF GLUTAMIC ACID IN
THE CHICKEN. (Eng.) Lerner, J.; Steinke,
L. (Dept. Biochemistry, Univ. Maine, Orono, ME
473). *Comp. Biochem. Physiol.* 57(1A):11-16; 1977.

97 EFFECT OF CHLORPROMAZINE ON 1-METHIONINE
TRANSPORT IN THE RAT INTESTINE. (Eng.)
ndaresan, P. R.; Rivera-Calimlim, L. (Sch. Medi-
ne and Dentistry, Univ. Rochester, Rochester, NY
642). *Biochem. Pharmacol.* 26(15):1411-1415; 1977.

98 EFFECTS OF CALCITONIN AND SUBSTANCE P ON
THE TRANSPORT OF Ca, Na, AND Cl ACROSS
T ILEUM IN VITRO. (Eng.) Walling, M. W.; Brasi-
is, T. A.; Kimberg, D. V. (Veterans Admin. Wadsworth
osp. Center, Los Angeles, CA 90073). *Gastroenter-
logy* 73(1):89-94; 1977.

5299 ENHANCEMENT OF INTESTINAL GLUCOSE TRANSPORT FOLLOWING CHRONIC PARATHION POISONING. (Eng.) Robinson, C. P.; Chol, J. J.; Pento, J. T. (Coll. Pharmacy, Univ. Oklahoma, Oklahoma City, OK 73190). *J. Pharm. Sci.* 66(6):879-880; 1977.

5300 INTESTINAL ABSORPTION ASPECT OF NON-LIPOPHILIC LOW MOLECULAR WEIGHT DRUGS: A CASE OF CEPHALEXIN AND CEFAZOLIN. (Eng.) Yasuhara, M.; Miyoshi, Y.; Yuasa, A.; Kimura, T.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(4):675-679; 1977.

5301 INTESTINAL ABSORPTION IN NORMAL INDIAN AND ENGLISH PEOPLE. (Eng.) Hellier, M. D.; Radhakrishnan, A. N.; Ganapathy, V.; Gammon, A.; Baker, S. J. (St. Thomas' Hosp., London SE1 7EH, England). *Br. Med. J.* 1(6003):186-188; 1976.

5302 COLONIC FUNCTION AND DIARRHEA [Abstract]. (Eng.) Debongnie, J. C.; Phillips, S. F. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1046; 1977.

5303 PHARMACOKINETICS OF ALCOHOL FOLLOWING SINGLE LOW DOSES TO FASTED AND NONFASTED SUBJECTS. (Eng.) Welling, P. G.; Lyons, L. L.; Elliott, R.; Amidon, G. L. (Sch. Pharmacy, Univ. Wisconsin, Madison, WI). *J. Clin. Pharmacol.* 17 (4):199-206; 1977.

5304 ANALYSIS OF AMINO ACID UPTAKE USING AN IN VITRO TECHNIQUE FOR PIG'S INTESTINAL MUCOSA [Abstract]. (Eng.) Harmeyer, J.; Martens, H.; von Grabe, C. (Physiologisches Institut der Tierarztlichen Hochschule Hannover, Bischofsholer Damm 15, D-3000 Hannover, W. Germany). *Z. Versuchstierkd.* 19:104; 1977.

5305 CHANGES IN ILEAL ABSORPTION OF AMINO ACIDS AND DIPEPTIDES AFTER PROXIMAL INTESTINAL RESECTION [Abstract]. (Eng.) Garrido, A.; Chung, Y.; Freeman, H.; Kim, Y. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1159; 1977.

See also, 5347, 5485, 5495, 5498, 5622, 5658, 5673, 5933, 5947, 5948.

5306 PROLONGED POTENTIALS IN GASTROINTESTINAL MUSCLES INDUCED BY CALCIUM CHELATION.

(Eng.) Prosser, C. L.; Kreulen, D. L.; Weigel, R. J.; Yau, W. (Dept. Physiology and Biophysics, Univ. Illinois, Urbana, IL 61801). *Am. J. Physiol.* 233 (1):C19-C24; 1977.

The effect of removing calcium in the gastrointestinal smooth muscles, using ethylene glycol-bis (β-aminoethyl ether)-N,N^1-tetracetic acid (EGTA) or EDTA was studied in stomach muscles of skate, toad, or frog, or intestinal muscle of the cat. Treatment of these tissues with Ca-free physiological solutions containing 2-5 mM EGTA or EDTA caused a reversible disappearance of spontaneous spikes and slow waves. With continued treatment, depolarization of 25-30 mV from resting potentials of -65 mV occurred, and rhythmic prolonged potentials of several seconds duration appeared. They showed rapid depolarization to near zero and rapid repolarization, and they continued for several hours. The prolonged potentials disappeared when Na was replaced by Li, Tris, or choline. The EGTA-induced waves were abolished by manganese, cobalt, lanthanum, verapamil, and methoxyverapamil. After 10-15 min in 5 mM EGTA, voltage-current curves of circular muscle showed increased leakage current and abolition of anomalous rectification. It is concluded that, when bound Ca is removed by a chelator, nonspecific reduction in resistance occurs, and Na ions may enter rhythmically through channels normally used by Ca.

5307 TOLERANCE TO THE EFFECT OF MORPHINE ON INTESTINAL TRANSIT.

(Eng.) Weisbrodt, N. W.; Badial-Aceves, F.; Dudrick, S. J.; Burks, T. F.; Castro, G. A. (Univ. Texas Medical Sch., P.O. Box 20708, 6400 W. Cullen, Houston, TX 77030). *Proc. Soc. Exp. Biol. Med.* 154(4):587-590; 1977.

Studies were carried out in Sprague-Dawley rats to assess quantitatively whether acute injections of morphine affect intestinal transit, and to determine whether prior chronic morphine treatment produces tolerance to the observed effects. Intestinal transit was determined using ^{51}Cr. At 60 and 120 min, the chromium traversed 50% of the gut length. In comparison with saline-treated controls, the intestinal transit time on the same day of acute administration of morphine sulfate (20 mg/kg, s.c.) was reduced; ^{51}Cr was distributed along the proximal 90% of the gut length after saline administration but only along the proximal 30% after one morphine injection. In rats injected with morphine (20 mg/kg, s.c.) three times daily for 7 days, intestinal transit was decreased to a lesser degree than in the rats that received only one injection; the ^{51}Cr traversed 70%, 70%, and 80% of the gut at 30, 60, and 120 min after the last injection, resp. This study represents an *in vivo* demonstration of morphine tolerance in transit through the small intestine.

5308 IMPROVED INFUSION SYSTEM FOR INTRALUMINAL ESOPHAGEAL MANOMETRY.

(Eng.) Arndorfer, R. C.; Stef, J. J.; Dodds, W. J.; Linehan, J. H.; Hogan, W. J. (Dept. Radiology, Medical Coll. Wisconsin, Milwaukee, WI). *Gastroenterology* 73(1):23-27; 1977.

A low compliance hydraulic-capillary infusion system that yields accurate recordings of esophageal peristaltic pressure at infusion rates of 0.6 ml/min or less is described. The hydraulic-capillary infusion system is based on an entirely different principle than syringe-pump systems. Reservoir water maintained at a high constant pressure is reduced to atmospheric pressure by capillary tubing with a high resistance to flow. Capillary flow rate is proportional to the pressure gradient across the capillary. Consequently, pressure events in the esophagus have relatively little effect on flow rate, because catheter pressure during peristalsis (about 50-200 mm Hg) remains low in comparison with the pressure head of the reservoir (1,000 mm Hg). Esophageal manometric studies were performed with the infusion system on five normal volunteers using three polyvinyl catheters with internal diameters of 0.6, 1.1, and 1.6 mm. Peristaltic pressures were recorded accurately with both the 0.8- and 1.1-mm catheters infused at 0.6 ml/min with the hydraulic-capillary infusion system. In contrast, an infusion rate of 3.2 ml/min was necessary to achieve recording fidelity using a syringe-pump system. Distal occlusion of the respective manometric catheters revealed that the pressure rise rate was inversely related to catheter internal diameter. Catheter compliance, in addition to being directly related to luminal internal diameter, was inversely related to catheter wall thickness and directly related to catheter elasticity and length. The 0.6-ml/min infusion rate used in the above study applies to polyvinyl catheters, and it is estimated that flow rates as low as 0.2 ml/min might be adequate if the manometric recording assembly were made of stiffer materials such as polyethylene. The hydraulic-capillary infusion system appears to be a useful tool for performing both clinical and investigative studies of esophageal motor function.

5309 EFFECT OF METOCLOPRAMIDE ON THE LOWER OESOPHAGEAL SPHINCTER: AN EXPERIMENTAL STUDY IN DOGS.

(Eng.) Punto, L.; Mokka, R. E. M.; Kairaluoma, M. I.; Larmi, T. K. I. (Dept. Surgery, Univ. Oulu, SF-90220 Oulu 22, Finland). *Med. Biol.* 55(1):66-68; 1977.

Because metoclopramide seems to be a promising supplement to the conservative treatment of reflux esophagitis, the esophageal, lower esophageal sphincter (LES), and gastric fundal pressures were measured in dogs before and after the i.v. injectio of metoclopramide (1 mg/kg). Pressures were measured with a triple lumen, open tip-infused catheter. The mean basal pressures of the fundus, the LES, and the lower esophagus were 2.4 ± 1.5, 7.7 ± 3.8, and -2 ± 1.3 mm Hg, resp. The mean pressure difference between the LES and the fundus was 5.3 ± 2.7 mm Hg, which constituted the LES pressure. Increased LES pressure was noted at 1 min after the injection (11.8 ± 5.2 mm Hg, $p<0.01$). The highest pressure occurred at 10 min after injection (13.7 ± 5.1 mm Hg, $p<0.01$), and the LES essure was still elevated 30 min after the jection (8.6 ± 3.9 mm Hg, $p>0.05$). Metoclopramide d no effect on the pressure of the canine fundus on the lower esophagus.

10 THE INFLUENCE OF OXYGEN SUPPLY TO THE SMALL INTESTINE IN THE ILEUS MODEL.

er.) Richter, H.; Jostarndt, L.; Tichai, I.; ermann, M. (Chirurgische Universitatsklinik, bert-Koch-Strasse 8, D-3550 Marburg/Lahn, W. rmany). *Chirurg* 47(6):328-330; 1977.

e effect of a mixture of Dextran 40 and 20% rbit on the local oxygen supply (PO_2) of the testinal wall was studied in the ileus model the rabbit. Experimental distention of the eum was performed in pentobarbital anesthetized bbits. An intraluminal pressure of 10, 20, or cm H_2O was applied via a polyvinylchloride se into the terminal ileum, and local PO_2 was asured with a superficial electrode on the rosa in nondistended intestinal wall before and ter administration of Sorbit (7.5 ml/kg i.v.) d glucagon (25 μg/kg). In the nondistended ileum, e local PO_2 was 42.2 ± 6.6 torr; at intralumal pressures of 10 cm, 20 cm, and 30 cm, it ll to 24.6 ± 5.9 torr, 16.5 ± 6.7 torr, and to .1 ± 8.6 torr, resp. After decompression, the $_2$ increased to 49.5 ± 9.1 torr, significantly gher than the initial value ($p< 0.025$). A significant increase of local tissue and arterial PO_2 s noted in the nondistended ileum following inction of Sorbit; glucagon caused no significant ange in local PO_2 in the distended or nondistended eum. The administration of Sorbit and decompreson of the distended intestine are recommended to prove the oxygen supply of the intestinal wall patients with ileus.

11 THE EFFECTS OF INDOMETHACIN ON THE TONE AND SPONTANEOUS ACTIVITY OF THE HUMAN ALL INTESTINE IN VITRO.

(Eng.) Burleigh, D. E. ondon Hosp. Medical Coll., Turner St., London, 2AD, England). *Arch. Int. Pharmacodyn. Ther.* 5(2):240-245; 1977.

e effects of indomethacin on the tone and sponneous activity of muscle strips from normal human rminal ileum were investigated. After nearly all rcular muscle spontaneous activity had disappeared after the muscle tone of the longitudinal strips d reached a stable level, indomethacin produced large and sustained increase in spontaneous tivity and, occasionally, a slight rise in tone circular muscle exposed to 0.05 and 0.55 μg/ml domethacin; in longitudinal muscle, tone was pidly lost and spontaneous activity was often duced after exposure to indomethacin concentrations 0.04 and 0.2 μg/ml. When indomethacin was added the beginning of the experiment, longitudinal scle strips failed to develop tone, and their ontaneous activity was reduced. Under the same nditions, spontaneous activity of the circular eum was increased and well maintained throughout e experiment. Indomethacin (5-10 μg/ml) did not duce contractions to acetylcholine (0.1-0.8 μg/ml) or prostaglandin $F_{2\alpha}$ (PG, 0.08-1 μg/ml) when tested on circular muscle strips from the ileum. The effects of PGE_2 differed from those of $PGF_{2\alpha}$ on circular muscle strips of the ileum. PGE_2 (0.04-1.0 μg) caused a small relaxation, together with a dose-related inhibition of spontaneous activity, while $PGF_{2\alpha}$ (0.08-1.0 μg/ml) caused a dose-related contraction, followed by a slight relaxation, with the latter being more apparent at lower doses. Unlike circular muscle, longitudinal strips gave contractions to both PGE_2 (0.02 μg/ml) and $PGF_{2\alpha}$ (0.02 μg/ml). The results suggest that prostaglandins may be involved in the maintenance of tone of longitudinal muscle and the suppression of spontaneous activity in circular muscle from the human terminal ileum.

5312 ACTIONS OF CHOLECYSTOKININ OCTAPEPTIDE ON SMOOTH MUSCLE OF ISOLATED DOG INTESTINE.

(Eng.) Stewart, J. J.; Burks, T. F. (Univ. Texas Medical Sch., Texas Medical Center, Houston, TX 77025). *Am. J. Physiol.* 232(3):E306-E310; 1977.

The action of cholecystokinin octapeptide on the smooth muscle of isolated dog intestine was investigated. Adult dogs were anesthetized, and segments of small intestine were isolated and perfused via a mesenteric artery with Krebs-bicarbonate solution. Agonists were administered as intra-arterial bolus injections, and antagonists were dissolved in the Krebs perfusion solution. The C-terminal octapeptide of cholecystokinin (CCK-OP) produced dose-related tonic and phasic contractions of smooth muscle along the transverse axis, and tonic and phasic relaxations along the longitudinal axis, of the muscle segments. The durations of response varied from about 1 min at a CCK-OP dose of 0.04 μg to more than 6 min at a dose of 5.0 μg. Smooth muscle responses to CCK-OP were reduced by atropine sulfate (0.1 μg/ml) and minimally affected by hexamethonium (10 μg/ml) perfusion. Tetrodotoxin (5 ng/ml) selectively reduced muscle responses to dimethylphenylpiperazinium (0.5 μg) and CCK-OP (0.2 μg), but failed to alter responses to bethanechol (5 μg). Higher concentrations of tetrodotoxin (10 ng/ml) abolished responses to CCK-OP. Depolarizing doses of nicotine (500 μg) selectively antagonized responses to 5-hydroxytryptamine (5HT, 5 μg) and CCK-OP (0.2 μg), but did not alter responses to bethanechol (5 μg). Perfusion with tetraethylammonium (1 mg/ml) reduced muscle responses to depolarizing doses of nicotine and abolished the nicotine-induced antagonism of 5HT and CCK-OP. It is concluded that the intestinal smooth muscle response to CCK-OP in the dog is mediated through a neurogenic mechanism and that CCK-OP interacts with a non-nicotinic receptor on postganglionic cholinergic neural elements in this preparation.

5313 A COMPARISON OF INTRINSIC NERVE SUPPLIES OF TWO MUSCULAR LAYERS OF DUODENUM.

(Eng.) Anuras, S.; Christensen, J.; Cooke, A. R. (Veterans Admin. Hosp., Univ. Iowa, Iowa City, IA 52242). *Am. J. Physiol.* 233(1):E28-E31; 1977.

The responses of feline and opossum duodenal longitudinal muscles to electrical field stimulation of the intrinsic nerves were compared to those of the circular muscles. The duodenums were cut into strips 2 mm wide and 2-2.5 cm long. Strips cut in the direction of the oral-caudal axis were called longitudinal strips, and those cut at 90 degrees to that axis were called circular strips. Each muscle strip was stimulated with trains of electrical rectangular pulses (10 Hz, 50-70 V, 0.5 msec). In the longitudinal strips, electrical field stimulation caused contraction, and this contraction was abolished by 10^{-7} M atropine. In the circular strips, electrical field stimulation caused relaxation. This relaxation was abolished by 10^{-7} M tetrodotoxin, but it was not affected by antagonists to adrenergic and cholinergic transmission or by pentagastrin, cholecystokinin, secretin, or cerulein (10^{-5}, 10^{-7}, 4×10^{-7}, and 1.5×10^{-8} M, resp.). Reserpinization of the opossums or alteration of the frequencies of electrical field stimulation from 0.1 to 50 Hz did not affect or alter the relaxation of the circular strips or the contraction of the longitudinal strips. These findings suggest that the longitudinal muscle is dominated by an excitatory cholinergic innervation and that the circular muscle is dominated by a nonadrenergic, noncholinergic inhibitory innervation.

5314 EFFECTS OF CHOLECYSTOKININ ON THE MOTILITY OF THE DISTAL DUODENUM AND PROXIMAL JEJUNUM IN MAN.

(Eng.) Fleckenstein, P.; Oigaard, A. (Rigshospitalet, Blegdamsvej, DK 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(3):375-378; 1977.

Since motility markedly increases in response to cholecystokinin (CCK) in the distal but not the proximal small intestine, experiments were carried out to determine more precisely at which point in the gastrointestinal tract the change in reaction to CCK occurs. Electrical spike potentials and intraluminal pressure variations were recorded in the distal duodenum and the proximal jejunum in five healthy subjects before and after an injection of CCK-pancreozymin (1 Ivy dog U/kg). CCK administration caused no change in duodenal motility but markedly increased activity in the proximal jejunum within 1-2 min. There were no changes in the amplitude of spike potentials either in the distal duodenum or in the proximal jejunum ($p>0.05$). It is concluded that the human duodenum differs from the rest of the small intestine in its reaction to cholecystokinin. The change in reaction appears to occur on a level with the ligament of Treitz.

5315 INHIBITORY EFFECT OF THE CALCIUM ANTAGONIST FENDILINE ON DIGITALIS GLYCOSIDE-INDUCED CONTRACTIONS IN THE GUINEA PIG TERMINAL ILEUM.

(Ger.) Sprugel, W.; Mitznegg, P.; Heim, F. (Pharmakologisches Institut, Universitat Erlangen-Nurnberg, 8520 Erlangen, W. Germany). *Arzneim. Forsch.* 27(7): 1405-1407; 1977.

Fendiline (0.01-1 μg/ml) caused a significant dose-dependent inhibition of contractions of isolated 10-mm segments of guinea pig terminal ileum that had been induced by the digitalis glycosides beta-acetyl-digoxin (0.4 μg/ml) or k-strophanthin (0.5 μg/ml). The effects of fendiline were reversible after three washings and reintroduction of beta-acetyl-digoxin (0.4 μg/ml). However, the contractions induced by the latter agent were markedly smaller as compared to the level of initial induction. Fendiline caused an almost 100% inhibition at a concentration of 1 μg/ml and a 30% inhibition at 0.01 μg/ml ($p<0.05$). Fendiline (1 μg/ml) totally suppressed the effects of k-strophanthin (0.5 μg/ml). The results suggest that the inhibitory effects of fendiline are probably due to its specific calcium antagonistic properties and that it may be useful clinically for manifest symptoms of digitalis intoxication caused by an increase of intracellular calcium ions.

5316 EFFECTS OF PROSTAGLANDINS ON THE PERISTALTIC REFLEX OF THE GUINEA-PIG ILEUM.

(Eng.) Fontaine, J.; Van Nueten, J. M.; Reuse, J. J. (Institut de Pharmacie, ULB, Brussels, Belgium). *Arch. Int. Pharmacodyn.* 226(2):341-343; 1977.

The effects of prostaglandin (PG) and some nonsteroidal anti-inflammatory prostaglandin synthesis inhibitors on the peristaltic reflex were studied in the isolated guinea pig ileum. Peristaltic reflex activity was induced by a sustained intraluminal pressure (2 cm H_2O). The addition of PGE_1 and PGE_2 (0.63-2.5 μg/l) facilitated the induction of peristaltic reflex activity and longitudinal muscle response, slightly decreased the circular muscle activity, and lowered the threshold for the expulsion of intraluminal fluid. After the additio of PGE_1 and PGE_2, more regular peristaltic reflex waves occurred in preparations in which peristalsis was spontaneously irregular. Indomethacin (0.63 and 2.5 mg/l) inhibited the rapid, noncholinergic part of the longitudinal muscle activity during the peristaltic reflex. A similar effect was observed with other nonsteroidal anti-inflammatory drugs, including suprofen, phenylbutazone, acetylsalicylic acid, and flufenamic acid. Higher concentrations of indomethacin (10 mg/l) and of the other drugs delayed the triggering of the reflex, inhibited the response of both the longitudinal and circular muscle layers, and caused incomplete expulsion of fluid during each wave. PGE_1 and PGE_2 reversed the inhibition caused by the anti-inflammatory drugs, suggesting that the activity of these drugs is related to the inhibition of PG synthetase. The results indicate that PG may play a modulating and normalizing role in the development of peristaltic reflex activity in isolated guinea pig ileum.

5317 THE EFFECTS OF PROSTAGLANDINS E_1, E_2, $F_{1\alpha}$ AND $F_{2\alpha}$ ON GUINEA-PIG ILEAL AND COLONIC PERISTALSIS.

(Eng.) Eley, K. G.; Bennett, A.; Stockley, H. L. (King's Coll. Hosp. Medical Sch., London SE5 8RX, England). *J. Pharm. Pharmacol.* 29(5):276-280; 1977.

The effects of prostaglandins (PG) E_1, E_2, $F_{1\alpha}$, and $F_{2\alpha}$ on the peristaltic reflex in isolated segments

guinea pig ileum and colon were studied using
multaneous recordings of fluid propulsion and
ngitudinal and circular muscle activity. In the
eum, $PGF_{1\alpha}$ and $PGF_{2\alpha}$ (0.33 µg/ml) when applied
rosally resulted in median propulsion increases
3% ($p<0.05$) and 12% ($p<0.01$), resp., and median
creases in circular muscle peristaltic activity
13% ($p<0.05$) and 11% ($p<0.01$), resp., after an
itial contraction of longitudinal muscle. Longi-
dinal muscle peristalsis in the ileum was not
gnificantly affected by the serosal application
either PGF compound, and the mucosal application
either compound (5 µg/0.5 ml) did not signifi-
ntly affect either propulsion or circular or
ngitudinal muscle peristaltic activity in the
eum. In the colon, the serosal application of
$F_{1\alpha}$ and $PGF_{2\alpha}$ (0.33 µg/ml) resulted in median
opulsion increases of 31% and 32% ($p<0.05$), resp.,
d median increases in circular muscle peristaltic
tivity of 53% ($p<0.05$) and 91% ($p<0.01$), resp.;
ngitudinal muscle peristaltic activity was not
gnificantly changed. Mucosal application of the
F compounds (5 µg/0.5 ml) did not result in
gnificant propulsive or peristaltic changes.
ither the serosal application (0.33 µg/ml) nor
e mucosal application (5 µg/0.5 ml) of PGE_1 or
E_2 resulted in significant changes in propulsion
the colon. However, the serosal application
PGE_1 and PGE_2 resulted in median increases in
rcular muscle peristaltic activity of 58% ($p<0.05$)
d 29% ($p<0.01$), resp., and in longitudinal muscle
ristaltic activity of 0% ($p<0.05$) and 12% ($p<0.01$),
sp., in the colon. The mucosal application of
E_1 and PGE_2 resulted in median increases in
ngitudinal muscle peristaltic activity of 10%
<0.05) and 0% ($p<0.05$), resp., in the colon. The
ove findings are consistent with a role for
ostaglandins in peristalsis.

318 MODULATION OF COLONIC MOTILITY BY PERIPHERAL NEURAL INPUTS TO NEURONS OF THE INFERIOR ESENTERIC GANGLION.

(Eng.) Weems, W. A.; Szurs-
ewski, J. H. (Univ. Texas Medical Sch., Houston,
77025). *Gastroenterology* 73(2):273-278; 1977.

tracellular recordings from single neurons in the
ferior mesenteric ganglion (IMG) of *in vitro* IMG-
olon preparations from guinea pigs were made simul-
aneously with measurements of intraluminal pressure
investigate interactions between colonic motility,
eripheral input to the IMG, and postganglionic
eural activity. Gross afferent input to the IMG
rom colonic mechanoreceptors was nonadapting and
orrelated with intraluminal pressure and propulsive
otor activity. At basal intraluminal pressures of
igher than approximately 5 cm of water, afferent
nput to neurons in the IMG increased with basal
ressure increases, until a maximum basal pressure
as reached, which ranged from 8 to 20 cm of water,
epending on each neuron tested. Preganglionic
nput from each nerve trunk attached to the IMG
ndependently altered colonic motility with varying
egrees of effectiveness. Fox example, stimulation
f the intermesenteric nerve in six IMG colon
reparations at frequencies of 1-3 Hz reduced or
bolished the nonpropulsive motor activity and
educed both orad and, to a much lesser extent,
cauded mean pressure. Similar inhibitory responses occurred at frequencies of 5 and 7 Hz in two other preparations tested. When a single inferior splanchnic nerve was tested, minimum frequencies ranging from 8 to 15 Hz were required to produce a detectable reduction in the nonpropulsive pressure wave amplitude and, usually, an accompanying decrease in mean intraluminal pressure at the orad end of the colonic segment. In six of eight IMG-colon preparations, stimulation of a single hypogastric nerve at 5-20 Hz reduced the amplitude of the nonpropulsive pressure waves in the orad end of the colonic segment. To determine whether colonic inhibition results from activation of "straight-through" pathways, as opposed to synaptic junction, in the IMG, four IMG colon preparations were superfused on the IMG side of a two-compartment bath with Krebs solution that either contained 1.44×10^{-4} M tubocurarine chloride or was calcium-free and contained 6 mM of magnesium ion. Within 15 min after the start of superfusion with the tubocurarine chloride-containing solution, both fast synaptic depolarizations and inhibition of colonic motility during stimulation of the intermesenteric, hypogastric, and inferior splanchnic nerves were abolished. Similar results were obtained when the calcium-free, high-magnesium solution was used. It is concluded that the firing patterns of sympathetic postganglionic neurons affecting motility of the terminal colon result primarily from the synaptic integration of inputs from preganglionic fibers of both central and peripheral origin.

5319 QUANTITATIVE STUDY OF GASTRIC EMPTYING BY MEANS OF ULTRASONICS: PRELIMINARY REPORT.

(Eng.) Okukubo, F.; Bruckner, W.; Busse, M.; Bundschuh, V. (Surgical Polyclinic, Munich Univ., W. Germany). *Chir. Gastroenterol.* 11(1): 37-39; 1977.

A quantitative method of studying gastric emptying, using ultrasonography, was developed and tested in 5 normal subjects and 20 duodenal ulcer patients without stenosis. The subjects swallowed an 800-ml test meal (soup) during 5 min. The abdomen was divided into 1-cm slices by making horizontal marks from the xyphoid process downward. The volume of the gastric contents was measured by ultrasonic scanning, which visualizes the horizontal slices of the stomach with 1-cm intervals from the fundus downward. The total volume of the stomach is calculated from the sum of all slices. Scanning was repeated every 10 min up to 80 min after meal ingestion. About 23% of the initial volume was emptied during the first 10 min in the normal subjects, and this emptying rate gradually decreased over the 80 min. This pattern was reproducible and was demonstrated in all five normal subjects at four different times on different days. The emptying rate in the duodenal ulcer patients was significantly lower than in controls. After 80 min, 40% of the test meal remained in the stomach, whereas only 15% remained in the stomachs of the controls. Only 11% of the initial volume was emptied during the first 10 min. There was no correlation between gastric emptying rate and basal or stimulated gastric acid secretion.

5320 CHARACTERIZATION OF GASTRIC EMPTYING BY DETERMINATION OF THE TRANSIT TIME. (Ger.)

Aeberhard, P.; Steudler, G.; Rosler, H.; Noelpp, U. (Klinik fur viszerale Chirurgie, Inselspital CH-3010, Bern, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):539-540; 1977.

The mean transit time (MTT) and half-time (T½) of gastric emptying were determined in 18 healthy men, aged 23-41 yr, given a solid test meal labeled with 500 μCi ^{99m}Tc-sulfur colloid by means of a gamma camera and on-line computer. MTT was calculated by fitting the time-activity histogram to a gamma variable, whereas T½ was obtained from the exponential curves. The MTT was 111.8 ± 18.55 min with a coefficient of variance of 0.17. On the other hand, the T½ was 78.1 ± 17.73 min with a coefficient of variance of 0.23. Thus, MTT showed a smaller coefficient of variance than T½ and this was statistically significant ($p<0.005$). The results suggest that MTT may be a more accurate measure of gastric emptying time and a more accurate method for distinguishing normal from pathological patterns of emptying.

5321 MEASUREMENT OF GASTRIC EMPTYING IN SMALL PRIMATES. (Eng.)

Hall, A. W.; Moossa, A. R.; Skinner, D. B. (Pritzker Sch. Medicine, Univ. Chicago, 950 East 59th St., Chicago, IL 60637). *J. Surg. Res.* 22(2):118-123; 1977.

Gastric emptying in eight rhesus monkeys given a test meal (via nasogastric intubation), consisting of 100 ml of 10% dextrose in water with 15 ppm of phenol red, was investigated. Calculated volumes of fluid in the stomach and the logarithms of the volumes were plotted against time. Assuming an exponential mode of disappearance from the stomach, the best line for the plotted points was fitted by the method of least squares. Gastric emptying was described mathematically by the constants of this line, the half-life of the meal in the stomach ($T½=0.301/b$, where b is the rate constant for the line), and by the time (T) taken for the intragastric contents to fall to 10 ml. Each monkey was studied twice at intervals of 2-6 weeks. There was no significant difference between the two experimental sets of values obtained for the rate constant, T½, or T, as compared by t tests ($p>0.5$). Analysis of variance confirmed that the variation between occasions tested was insignificant. A marked difference between animals ($p<0.001$) was demonstrated. From the residual variation, the standard deviation of the experimental error was estimated. This was ± 0.000476 for the rate constant, ± 15.4 min for T½, and ± 54.6 min for T. The mean T½ values for both sets of studies were 119.4 ± 51.1 min and 123.6 ± 60.6 min, resp. It is suggested that the above method is useful for investigating the impact of operative procedures on gastric emptying in higher animals.

5322 GASTRIC EVACUATION AND PROPULSIVE INTESTINAL MOTILITY IN ACUTE AFFERENT LOOP SYNDROME IN THE RAT. (Eng.)

Dahlgren, S. (Karnsjukhuset Skovde, Fack, S-54101 Skovde, Sweden). *Ups. J. Med. Sci.* 81(2):97-102; 1976.

Gastric evacuation and propulsive intestinal motilit in Sprague-Dawley rats with acute afferent loop syndrome (ALS), i.e., occlusion of the afferent loop after partial gastrectomy by the Billroth II method, were investigated. A standardized radioactive test meal was deposited in the stomach of test rats immediately after the afferent loop had been ligated or, in control rats, after the dissection of the afferent loop. Gastric evacuation was exponential and was markedly delayed in rats with ALS compared with laparotomized controls. The percentages of radioactive dose in the stomach of ALS rats at 0.5 and 4 hr after test meal deposition were 89.9 ± 2.36 and 65.5 ± 6.05, resp., compared with control values of 67.8 ± 4.20 and 30.8 ± 7.75, resp. The differences between test rats and contro rats were significant ($p<0.0005$) at both times after meal deposition. An examination of the percentage distribution of the test meal dose in 10 equal consecutive fractions of the small intestine and in the colonic fraction revealed that propulsio was considerably delayed in rats with ALS as compared with controls. The propulsion in the distal direction 0.5 hr after test meal deposition reached the second fraction of the small intestine in contr rats and the first fraction in ALS rats. After 4 hr, the colonic fraction was reached in controls an in the second small intestinal fraction in ALS rats After 8 and 12 hr, the second and fifth fractions, resp., were reached in the ALS rats. Gastric evacuation and propulsive intestinal motility in ALS rats were also delayed in relation to previous findings involving mechanical intestinal obstruction and paralytic ileus due to retroperitoneal irritation or bacterial peritonitis.

5323 INHIBITION OF GASTRIC AND INTESTINAL MOTO ACTIVITY IN DOGS BY (Gln^{4}) NEUROTENSIN.

(Eng.) Andersson, S.; Rosell, S.; Hjelmquist, U.; Chang, D.; Folkers, K. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol Scand.* 100(2):231-235; 1977.

The action of (Gln^{4})-neurotensin on the spontaneous motor activity in isolated canine fundic, antral, and intestinal pouches was studied. All pouches had been prepared more than 6 months prior to the experiments. Spontaneous motor activity was record for at least 1 hr before the (Gln^{4})-neurotensin was infused i.v. for 30 min in doses ranging between 6.3 and 100 ng/kg/min. In the vagally denervated fundic pouches, (Gln^{4})-neurotensin inhibited motor activity in doses above 25 ng/kg/min. The vagally innervated antral pouches were more sensitive than the vagally denervated fundic pouches to the actio of (Gln^{4})-neurotensin. Thus, motor inhibition was induced by doses as low as 6.3 ng/kg/min. The effect of (Gln^{4})-neurotensin on motor activity in intestinal pouches was inconsistent. Inhibition was seen in one of seven experiments. The results show that the gastric motor activity is the most sensitive function to (Gln^{4})-neurotensin so far studied.

324 EFFECTS OF PROXIMAL GASTRIC VAGOTOMY (PGV)
FOLLOWED BY TOTAL VAGOTOMY (TV) ON POST-
RANDIAL AND FASTING MYOELECTRICAL ACTIVITY OF THE
ANINE STOMACH AND DUODENUM. (Eng.) Aeberhard, P.;
edi, B. S. (Inselspital, CH-3010 Berne, Switzer-
and). *Gut* 18(7):515-523; 1977.

he effect of proximal gastric vagotomy (PGV) fol-
owed by total vagotomy (TV) on the myoelectrical
ctivity of the canine stomach and duodenum was
tudied after a meat meal and during fasting. Dogs
ere prepared with chronically implanted Ag-AgCl-
lectrodes on the stomach and duodenum. Recordings
f electrical activity were made for 1 hr after the
ngestion of a meat meal, and records of 4-6 hr were
aken on the fasting animals. In the postprandial
ecords, no effect on coordination of antral and
uodenal myoelectrical activity was found after
ither PGV or TV. These results suggest that the
oordinating mechanism is not dependent on vagal
nnervation. Impairment of gastric emptying after
V does not appear to be due to disturbance of
ntral-duodenal conduction. Normal patterns of
asting activity were found in control and after PGV.
hey were grossly disturbed after TV, probably be-
ause of delayed gastric emptying. These findings
uggest that PGV does not delay gastric emptying
s does TV, and that the proximal vagal supply to
he stomach is unimportant in the control of fasting
ctivity.

325 EFFECT OF SECRETIN ON MYOELECTRICAL AND
MECHANICAL ACTIVITY OF THE ISOLATED CANINE
TOMACH PERFUSED EX VIVO. (Eng.) Kowalewski, K.;
olodej, A. (Surgical-Medical Res. Inst., Univ.
lberta, Edmonton, Alberta T6G 2N8, Canada). *Phar-
acology* 15(1):73-83; 1977.

otally isolated whole canine stomachs perfused
x vivo with homologous blood were used for recording
yoelectrical and mechanical activity prior to and
ollowing secretin injection into the gastric
rterial circulation. Flash injections of secretin
n doses up to 32 U had no significant effect on
lectrical control activity (ECA) frequency or
hase lag; a similar result was obtained when secre-
in was given as a 60 U/hr constant infusion. This
bsence of a secretin action on ECA was found under
arious conditions of background gastric stimulation
intragastric instillation of fluid, infusion of
entagastrin or bethanechol chloride, and electrical
timulation of the Latarjet branch of the vagus
erve). Flash injections of secretin (16 or 32 U)
gainst a background vagal stimulation of Latarjet
erve (steady stimulation with 10 V, 6 Hz, and 5
sec pulses) resulted in a temporary inhibition of
esponse activity. After 16 U of secretin, the
ntral ECA cycles with electrical response ac-
ivity (ERA) was 72.40 ± 9.5% as compared with
00% prior to secretin treatment ($p<0.001$); after
2 U secretin, the percentage of antral ECA cycles
ith ERA was 34.60 ± 3.2 ($p<0.001$). Secretin
iven as flash injections (16 or 32 U) or as a
onstant infusion (60 U/hr) produced significant
ecreases ($p<0.001$) of contraction amplitudes or
echanical activity recorded at the site of an
ntral strain gauge. For example, a flash injection
of 32 U of secretin reduced the contraction amplitude from 7.00 ± 2.0 to 0.89 ± 1.3 mm. Flash injections of either pentagastrin or methacholine produced premature control potentials, uncoupling of ECA, marked response activity, and antral contractions. When applied against a constant infusion of secretin, these stimulants induced a decreased response that was particularly apparent regarding the timing and amplitude of antral contractions.

5326 A NON-ADRENERGIC INHIBITORY INNERVATION IN THE RAT STOMACH. (Eng.) Heazell, M. A. (Res. Inst., May & Baker Ltd., Dagenham, Essex, RM10 7XS, England). *Arch. Int. Pharmacodyn.* 226(1): 109-117; 1977.

5327 THE EFFECT OF CYCLIZINE HYDROCHLORIDE ON LOWER OESOPHAGEAL SPHINCTER PRESSURE IN MAN. (Eng.) Brock-Utne, J. G.; Downing, J. W.; Dimopoulos, G. E.; Moshal, M. G. (King Edward VIII Hosp., Durban, South Africa). *South Afr. Med. J.* 51(26):977-978; 1977.

5328 THE SYNTHESIS AND BIOLOGICAL ACTIVITY OF PROSTAGLANDIN ANALOGS CONTAINING SPIROCYCLIC RINGS. (Eng.) Arndt, H. C.; Biddlecom, W. G.; Hong, E.; Myers, C.; Peruzzotti, G. P.; Woessner, W. D. (Miles Lab., Inc., 3301 Kinsman Blvd., Madison, WI 53704). *Prostaglandins* 13(5):837-843; 1977.

5329 ANORECTAL CLOSING MECHANISMS. (Eng.) Wilson, P. M. (Dept. Anatomy, Univ. Tasmania, Hobart, Tasmania, Australia). *S. Afr. Med. J.* 51(22):802-808; 1977.

5330 EFFECT OF TEMPERATURE OF PERORALLY ADMINISTERED PHENOL RED SOLUTION ON GASTRIC EMPTYING IN THE RAT. (Eng.) Erni, W.; Ritschel, W. A. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Arzneim. Forsch.* 27(5):1043-1045; 1977.

5331 GI PHARMACOLOGY OF POLYETHYLENEIMINE I: EFFECTS ON GASTRIC EMPTYING IN RATS. (Eng.) Melamed, S.; Carlson, G. R.; Moss, J. N.; Belair, E. J.; Tansy, M. F. (Research Lab., Rohm and Haas, Co., Spring House, PA 19477). *J. Pharm. Sci.* 66(6):899-901; 1977.

5332 GI PHARMACOLOGY OF POLYETHYLENEIMINE II: MOTOR ACTIVITY IN ANESTHETIZED DOGS. (Eng.) Tansy, M. F.; Martin, J. S.; Innes, D. L.; Kendall, F. M.; Melamed, S.; Moss, J. N. (Health Sciences Center, Temple Univ., Philadelphia, PA 19140). *J. Pharm. Sci.* 66(6):902-904; 1977.

5333 EFFECT OF ORGANIC ACID ON GASTROINTESTINAL MOTILITY OF RAT IN VITRO. (Eng.) Yokokura, T.; Yajima, T.; Hashimoto, S. (Yakult Inst. for Microbiological Res., 1796 Yaho Kunitachi, Tokyo, Japan). *Life Sci.* 21(1):59-62; 1977.

5334 FREQUENCY ENTRAINMENT OF COUPLED HODGKIN-HUXLEY-TYPE OSCILLATORS FOR MODELING GASTRO-INTESTINAL ELECTRICAL ACTIVITY. (Eng.) Linkens, D. A.; Datardina, S. (Dept. Control Engineering, Univ. Sheffield, Sheffield, Yorks, England). *IEEE Trans. Biomed. Eng.* 24(4):362-365; 1977.

5335 A MIXED ISOTOPE METHOD FOR THE STUDY OF GASTRIC ABSORPTION OF DRUGS. (Eng.) Pierce, D. M.; Franklin, R. A. (Wyeth Lab., Huntercombe Lane South, Taplow, Maidenhead, Berks, England). *J. Pharm. Pharmacol.* 29(5):308-309; 1977.

5336 GASTRO-INTESTINAL ABSORPTION OF n-NITROSODIMETHYLAMINE IN GUINEA-PIGS. (Eng.) Ishiwata, H.; Mizushiro, H.; Tanimura, A.; Murata, T. (Natl. Inst. Hygienic Sciences, 18-1, Kamiyoga 1-chome, Setagaya-ku, Tokyo, Japan). *J. Food Hyg. Soc. Jpn.* 18(1):57-58; 1977.

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5338 THE COMPUTATION OF SATURABLE AND LINEAR COMPONENTS OF INTESTINAL AND OTHER TRANSPORT KINETICS. (Eng.) Atkins, G. L.; Gardner, M. L. G. (Univ. Edinburgh Medical Sch., Teviot Place, Edinburgh, EH8 9AG, England). *Biochim. Biophys. Acta* 468(1):127-145; 1977.

5339 EFFECT OF WHOLEMEAL AND WHITE BREAD ON IRON ABSORPTION IN NORMAL PEOPLE. (Eng.) Dobbs, R. J.; Baird, I. M. (West Middlesex Hosp., Isleworth, Middlesex, England). *Br. Med. J.* 1(6077): 1641-1642; 1977.

5340 GLUCOSE STIMULATES FRUCTOSE ABSORPTION: CLINICAL IMPLICATIONS IN HEALTH AND DISEASE [Abstract]. (Eng.) Milla, P. J.; Muller, D. P. R.; Harries, J. T. (Inst. Child Health, Great Ormond St., London WC1, England). *Arch. Dis. Child.* 52(5):429; 1977.

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5342 EFFECT OF SURFACTANTS ON TRANSMUCOSAL FLUI MOVEMENT AND DRUG ABSORPTION FROM RAT SMAL INTESTINE. (Eng.) Kitazawa, S.; Ishizu, M.; Kimura K. (Kyoto Univ. Hosp., Kawara-cho Shogoin, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(4):590-600; 1977.

See also, 5268, 5343, 5446, 5456, 5477, 5486, 5519, 5559, 5567, 5569, 5582, 5652, 5720, 5738, 5930.

SECRETION AND METABOLISM

5343 MOTILIN: SPECTRUM AND MODE OF GASTROINTESTINAL ACTIONS. (Eng.) Domschke, W. (Dept. Medicine, Univ. Erlangen-Nuremberg, Krankenhausstr. 12, D-852 Erlangen, W. Germany). *Am. J. Dig. Dis.* 22(5):454-461; 1977.

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5348 ACINAR CELL HYDROPIC DEGENERATION INDUCED BY INTRADUCTAL INSTILLATION OF SOLUTIONS INTO THE PAROTID GLANDS OF THE RATS. (Eng.) Sela, J.; Schechter, D.; Rosenmann, E.; Boss, J. H. (Hebrew Univ. Hadassah Medical Sch., Jerusalem, Israel). *Virchows Arch.* [*Pathol. Anat.*] 374(1): 63-69; 1977.

5349 QUANTITATIVE STUDY OF SECRETORY GRANULES OF THE PAROTID GLAND ACINAR CELL OF THE RAT. (Eng.) Itoh, T. (Faculty Medicine, Kagoshima Univ., Kagoshima, 890 Japan). *J. Electron Microsc.* 26(1):19-28; 1977.

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5351 SECRETORY BEHAVIOUR OF HYPERTROPHIC AND HYPERPLASTIC SALIVARY GLAND. (Eng.) Barka, T.; Burke, G. T. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Histochem. J.* 9(4):453-466; 1977.

5352 PHYSIOLOGICAL EFFECTS OF GASTROINTESTINAL HORMONES. (Eng.) Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Fed. Proc.* 36(7):1930-1932; 1977.

5353 TROPHIC EFFECTS OF GASTROINTESTINAL HORMONES: PHYSIOLOGICAL IMPLICATIONS. (Eng.) Enochs, M. R.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77030). *Fed. Proc.* 36(7):1942-1947; 1977.

5354 ORIGIN OF ESTERASES IN HUMAN WHOLE SALIVA. (Eng,) Lindqvist, L.; Nord, C. E.; Soder, P. O. (Dept. Biochemistry, Univ. Stockholm, Stockholm, Sweden). *Enzyme* 22(3):166-175; 1977.

5355 WASTING SYNDROME IN NEONATAL MICE AFTER ADMINISTRATION OF SALIVARY GLAND HOMOGENATE. (Eng.) Tuch, K.; Matthiesen, T. (Dept. Experimental Pathology, Chemie Grunenthal GmbH, D-5190 Stolberg, W. Germany). *Experientia* 33(6):764-765; 1977.

See also, 5267, 5273, 5777.

SECRETION AND METABOLISM

Stomach

5356 BIOCHEMICAL GRADIENTS IN THE HUMAN GASTRIC AND DUODENAL MUCOSA IN RELATION TO BASAL ACID OUTPUTS. (Eng.) Mozsik, G.; Vizi, F.; Kutas, J. (Univ. Medical Sch., H-7643 Pecs, Hungary). *Scand. J. Gastroenterol.* 12(4):461-464; 1977.

Separations and measurements of adenine-adenosine, AMP, ADP, ATP, lipid phosphates (lipid-P), RNA, and DNA were carried out in the mucosa of the corpus, antrum, and duodenum of 32 peptic ulcer patients. The patients were divided into three groups based on their basal acid output (BAO): BAO< 2,0 mEq/hr, BAO=2.0-4.0 mEq/hr, and BAO >4.0 mEq/hr. The results were calculated in correspondence to 1.0 mg DNA value. The biochemical composition of the corpus and antral mucosa was altered with increased BAO. In patients with normal and increased BAO, a significant difference in the biochemical compositions of the mucosa of the corpus and antrum was observed. No significant difference was found in the duodenal mucosa with decreased BAO. These results indicate the presence of an energetical and biochemical gradient in the human gastric corpus, antral, and duodenal mucosa in relation to BAO.

5357 CALCIUM STIMULATION OF GASTRIN AND GASTRIC ACID SECRETION: EFFECT OF SMALL DOSES OF CALCIUM CARBONATE. (Eng.) Behar, J.; Hitchings, M.; Smyth, R. D. (Rhode Island Hosp., 593 Eddy St., Providence, RI 02902). *Gut* 18(6):442-448; 1977.

The interaction of calcium, serum levels of immunoreactive gastrin, and gastric acid secretion was investigated in 25 duodenal ulcer patients with respect to (a) the site of calcium stimulation and (b) whether the calcium effect on gastric acid secretion is mediated by gastrin. Calcium carbonate (0.5 g, p.o., pH 9.4) increased serum gastrin ($p<0.05$) and gastric acid output ($p<0.001$), with slight but insignificant change in serum calcium. A similar rise in serum calcium during an i.v. infusion of calcium gluconate failed to increase serum gastrin and gastric acid output. Both intragastric calcium actions were abolished by acidification of the calcium carbonate solution (pH 1.0). The increase in serum gastrin and gastric acid output after intragastric calcium carbonate was not affected, however, by a simultaneous intraduodenal acid load. Equivalent neutralizing doses of magnesium hydroxide (pH 9.4) did not increase serum gastrin and gastric acid output above basal levels, whereas antral acidification with 20 ml 0.1 N HCl resulted in a slight decrease in serum gastrin. Intraduodenal calcium carbonate (pH 3.0) also increased serum gastrin and gastric acid output, whereas an equivalent volume of intraduodenal saline (pH 3.0) had no effect. These findings indicate that calcium increases serum gastrin by local stimulation of antral and duodenal mucosa and suggest that the action of calcium on gastric secretion is partly mediated by gastrin.

5358 EFFECT OF FAT ON MEAL-STIMULATED GASTRIC AND PANCREATIC SECRETION. (Eng.) Llanos, O. L.; Swierczek, J. S.; Miller, T. A.; Said, S. I.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *World J. Surg.* 1(4): 507-513; 1977.

The effects of fat on meal-stimulated gastric and pancreatic secretion, and on gastrin, secretin, gastric inhibitory peptide (GIP), and vasoactive intestinal polypeptide (VIP), were investigated in five dogs with chronic gastric and pancreatic fistulas. Gastric secretion was continuously stimulated with a 10% liver extract meal and kept at a constant pH 7 by intragastric titration. After the 1st hr of stimulation, intraduodenal sodium oleate was infused in graded doses (2-16 mmol/hr). Plasma gastrointestinal hormones were determined by radioimmunoassay. The liver extract meal evoked a gastric acid output of 12 ± 1.4 mEq/30 min and a rise in plasma gastrin from 90 ± 20 to 250 ± 50 pg/ml. Sodium oleate produced inhibition of acid secretion by 40% and 70% at doses of 8 and 16 mmol/hr, resp. Sodium oleate produced a dose-dependent increase in the volume of pancreatic juice and bicarbonate and protein output. Meal-stimulated plasma gastrin levels were not affected by sodium oleate. Plasma secretin and VIP levels remained unchanged during the infusion of sodium oleate. GIP was released by liver extract meal and, in addition, in a dose-related fashion by graded doses of sodium oleate. It is concluded that VIP and secretin are not released by fat and that they are not involved in the inhibition of gastric secretion. GIP may be one of the mediators in the inhibition of gastric acid secretion by fat. The inhibition of acid secretion by fat is not mediated by suppression of gastrin release.

5359 HISTAMINE-SENSITIVE ADENYLATE CYCLASE OF HUMAN GASTRIC MUCOSA. (Eng.) Simon, B.; Kather, H. (Medizinischen Universitatsklinik Heidelberg, Heidelberg, W. Germany). *Gastroenterology* 73(2):429-431; 1977.

The effects of histamine, prostaglandin E_2, sodium fluoride, and 5-guanylyl-imidodiphosphate [GMP(PNP)] on the adenylate cyclase system of human fundic gastric mucosa was investigated. This system responded to all activators. Half-maximal stimulation of enzyme activity was observed at a histamine concentration of 50 μM. Maximal stimulation (about 250%) occurred at a histamine concentration of 1 mM. The stimulatory effect of histamine was competitively inhibited by cimetidine (10 and 50 μM). The stimulatory effect of prostaglandin E_2 was dose-dependent over a concentration range of 0.1 μM-1 mM, exerting maximal effects at 0.3 mM. NaF and GMP(PNP), by inducing an about 3.5-fold increase of enzyme activity, were more potent in stimulating the human enzyme system than were histamine and prostaglandin E_2. Maximal stimulatory doses of prostaglandin E_2 and histamine had an additive effect on the adenylate cyclase activity from fundic gastric mucosa. This result implies that histamine acts on an individual adenylate cyclase system. The results suggest the existence of an adenylate cyclase system in human gastric mucosa coupled to histamine H_2-receptor site

5360 METHYLATION OF HISTAMINE IN THE GASTRIC MUCOSA. (Eng.) Maslinski, S.; Schippert, B.; Kovar, K. A.; Sewing, K. F. (Dept. Pharmacology, Univ. Tubingen, Tubingen, W. Germany). *Digestion* 15(6):497-505; 1977.

Methylation of histamine in the gastric mucosa of guinea pigs, cats, dogs, rats, and pigs was studied *in vitro* and *in vivo*. When gastric mucosal homogenates of these species were incubated with ^{14}C-histamine in the presence of S-adenosyl methionine, N^{τ}-methylhistamine was formed as the only methylated histamine derivative. Excessive concentration of N^{τ}-methylhistamine inhibited the formation of N^{τ}-methylhistamine. Pretreatment of guinea pigs with prednisolone (25 mg/kg, i.p., 4 days), aminoguanidine (250 mg/kg x 2), or pentagastrin (125 μg/kg x 3) neither influenced *in vitro* the formation of N^{τ}-methylhistamine significantly nor shifted the methylation reaction towards the side-chain. Pretreatment of guinea pigs with cimetidine (25 mg/kg x 3, i.p.) significantly enhanced the formation of N^{τ}-methylhistamine *in vitro*. In pooled samples of guinea pig gastric mucosa histamine and N^{τ}-methylhistamine were found. Under none of these circumstances was N^{α}-methyl- or N^{α},N^{α}-dimethylhistamine found. It is concluded that, in rat, guinea pig, cat, dog, and pig gastric mucosa, the formation of N^{τ}-methylhistamine is the only methylating pathway of histamine. In cases where other methylated histamine derivatives (N^{α}-methyl- and/or N^{α},N^{α}-dimethylhistamine) are found, they must originate in sources other than the gastric mucosa.

5361 EFFECT OF THE PROSTAGLANDIN PRECURSOR, ARACHIDONIC ACID, ON HISTAMINE STIMULATED GASTRIC SECRETION IN THE CONSCIOUS DOG, AND OBSERVATIONS ON THE EFFECT OF INHIBITING ENDOGENOUS PROSTAGLANDIN SYNTHESIS. (Eng.) Conolly, M. E.; Bieck, P. R.; Payne, N. A.; Adkins, B.; Oates, J. A. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12, England). *Gut* 18(6):429-437; 1977.

The effects of i.v. infusions of prostaglandin E_2 (PGE_2) and arachidonic acid (AA) on histamine-stimulated gastric secretion were studied in conscious dogs with either a simple gastric fistula or a denervated Heidenhain pouch. Both compounds produced a dose-related inhibition of acid secretion, though AA was 86.5 to 203.2 times less potent than PGE_2. The maximal effect of AA was not achieved until 20-40 min after the infusion had ceased, suggesting that AA has to undergo some kinetic or metabolic process before it can act. Eicosatetraynoic acid (ETYN) 1.0 μg/kg/min, an inhibitor of PG biosynthesis, almost totally abolished the antisecretory effect of AA up to 200 μg/kg/min. At 400 μg AA/kg/min, the antisecretory effect was reduced by about one-half. The effect of PGE_2 was not altered by ETYN. Furthermore, ETYN did not increase the response to histamine stimulation in control studies; this result suggests that prostaglandins are not involved in regulating gastric secretion in this model.

362 STIMULATION OF PROSTAGLANDIN OUTPUT FROM RAT STOMACH BY HYPERTONIC SOLUTIONS.

(Eng.) Assouline, G.; Leibson, V.; Danon, A. (Clinical Pharmacology Unit, Ben-Gurion Univ. of the Negev, Beer-Sheva, Israel). *Eur. J. Pharmacol.* 44 (3):271-273; 1977.

The effects of hypertonic solutions on the prostaglandin (PG) E output of a whole-cell preparation of rat stomach were investigated. In control experiments, the time course of PGE output indicated higher initial outputs, which then stabilized after 60 min at mean outputs of 2.5-2.9 ng/100 mg/30 min. Hypertonic sodium chloride or mannitol or urea buffers were added after 120 min. A 750 mOsm NaCl buffer produced 2.0- and 3.3-fold increases in PGE outputs at 150 and 180 min, resp., above the level observed at 120 min, while a 1,500 mOsm NaCl buffer stimulated PGE output 10.2- to 11.7-fold. PGE output was enhanced to a comparable degree with 1,500 mOsm hypertonic mannitol buffer (12.7 and 8.3-fold increases at 150 and 180 min, resp.), whereas the same osmolar concentration of urea was much less effective (2.0 and 1.3-fold stimulation). The osmolarity of the gastric contents may play a role in regulating gastric PG biosynthesis.

363 INHIBITION IN THE RAT OF GASTRIC ACID SECRETION AND CYCLIC AMP ANALOGS ACCUMULATION IN VITRO BY SOMATOSTATIN.

(Eng.) Lippmann, W. (Biochemical Pharmacology Dept., Ayerst Res. Lab., P.O. Box 6115, Montreal, Quebec H3C 3JI, Canada). *Experientia* 33(1):61-63; 1977.

The effects of somatostatin and its analogs on gastric acid secretion and on prostaglandin-induced pituitary cyclic AMP were investigated in unanesthetized male rats. Somatostatin (0.6 μmol/kg, s.c.) decreased the basal gastric acid output from 60 μEq/15 min to 10 μEq/15 min for a period of 15 min with maximal inhibition occurring by 30 min. Somatostatin (1 x 10^{-7} M) inhibited the adenohypophyseal cyclic AMP accumulation induced by prostaglandin E_2 by about 50%. At 0.6 μmol/kg, Di-Gly-somatostatin (Di-Gly-S), and Leu-di-Gly-S exhibited activities, with respect to the duration and degree of inhibition, similar to somatostatin (86 min, 71%). Leu-di-Gly-[descarboxy^{14}]-S was shorter in duration of action (41 min) while being as effective in degree of inhibition. [Des-Ala^{1}Gly^2][desamino^3][descarboxy^{14}]-S was shorter in duration of action than somatostatin (39 min versus 90 min) but exhibited a similar degree of inhibition (60% versus 59%); similar activities were exhibited by [Des-Ala^{1}Gly^2][acetyl^3][descarboxy^{14}]-S (43 min versus 74 min, 72% versus 75%). Each of the analogs was similar to somatostatin with respect to the maximal inhibitory effect and time in reaching this effect; the less active analog allowed a more rapid rate of return to control secretory levels than did somatostatin. At 1 x 10^{-7} M, di-Gly-, tri-Gly- and [Des-Ala^{1}Gly^2][acetyl^3][descarboxy^{14}]-S and [Des-Ala^{1}Gly^2][desamino^3][descarboxy^{14}]-S analogs showed similar inhibitory activity; the retro-enantio-derivative of the latter analog was ineffective even at 1 x 10^{-4} M as was [desamino^1][descarboxy^{14}]-retro-enantio-S. With the analogs examined, the gastrointestinal and pituitary receptors appear to exhibit generally similar recognition specificity with the differences within the gastrointestinal activities reflecting duration of availability rather than receptor affinity.

5364 EXPERIMENTAL STUDY ON THE INHIBITORY MECHANISM OF GASTRIC SECRETION: THE INHIBITORY EFFECT OF ELECTRICAL AUTONOMIC NERVE STIMULATION, AND ANTRAL AND DUODENAL ACIDIFICATION ON TETRAGASTRIN-STIMULATED GASTRIC SECRETION IN DOGS.

(Jpn.) Kondo, T. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Shikake Acta Med.* 31(6):417-432; 1975.

The effects of electrical autonomic nerve stimulation (hepatic, celiac branches, and greater splanchnic nerve) and of antral and duodenal acidification on tetragastrin-stimulated gastric secretion were studied in 38 anesthetized dogs with total gastric fistula. Electrical stimulation of the hepatic nerves decreased acid secretion by 34.5% and pepsin secretion by 43.3%. Acid secretion was significantly decreased 42.5% by electrical stimulation of the celiac branches, and pepsin secretion was significantly increased 39.8%. Greater splanchnic nerve stimulation resulted in significant decreases in acid and pepsin secretion (50.3% and 54.2%, resp.). Antral acidification failed to inhibit gastric secretion, but duodenal acidification significantly decreased acid secretion 49.2% and pepsin secretion 46.4%. The hepatic, celiac branches, and greater splanchnic nerve have an inhibitory effect on gastric secretion.

5365 VAGAL INFLUENCES ON GASTRIC ACID SECRETION. EXPERIMENTAL STUDIES IN CATS.

(Eng.) Svensson, S. O. (Karolinska Institutet, Stockholm, Sweden). *Scand. J. Gastroenterol.* 11(40):1-34; 1976.

The effect of various stimulatory and inhibitory factors on gastric acid secretion was studied in cats to evaluate the physiological significance of such factors on oxyntic glands. The results are discussed in relation to six reference papers. Cats had either a vagally denervated fundic pouch (HP) to eliminate vagal influence on oxyntic glands or a vagally innervated mucosal septal fundic pouch. A dose-response relationship was found between the amount of food consumed and the HP acid response. The maximal postprandial acid response was 70% of the maximal HP response to pentagastrin (i.v., 0.25-128 μg/kg/hr), suggesting that feeding does not release enough gastrin to produce maximal stimulation of the oxyntic glands. A high correlation was noted between the HP acid secretion and the immunoreactive gastrin level in the serum of HP cats. Basal vagal tone and a threshold dose of a stable choline ester (methacholine, 15-30 μg/kg/hr) increased the sensitivity and secretory capacity of the oxyntic glands following stimulation with gastrin. A physiological increase of vagal activity above basal level by feeding was more effective than basal vagal tone in enhancing the acid response to a submaximal dose of gastrin. It is suggested that endogenous gastrin is the main stimulus of acid secretion in HP cats during the first postprandial hour and that a cholinergic mechanism is involved in postprandial gastrin release.

5366 GASTRIC ACID SECRETION IN GASTRIC FISTULA DOGS AFTER ANTRAL DENERVATION AND ANTRECTOMY.

(Eng.) Trout, H. H., III; Elashoff, J.; Harmon, J. W. (Walter Reed Army Medical Center, Washington, DC 20012). *Gastroenterology* 73(3): 492-494; 1977.

Studies were carried out in gastric fistula dogs to determine whether the increase in maximal histamine and gastrin-stimulated acid secretion seen after antrectomy can also be detected in the innervated *in situ* gastric remnant and whether it could be a consequence of vagal denervation of the duodenum during antrectomy. Dogs with gastric fistulae were tested with histamine and tetragastrin as a control study. The vagal nerve fibers to the antrum were divided, and the dogs underwent repeat testing. Finally, an antrectomy was performed and final dose-response data were collected. After antrectomy, there was an increased acid response to histamine ($p<0.05$) and tetragastrin (not significant). It is postulated that the vagal fibers innervating the antrum are probably not a factor in this increase. The fact that increased acid secretion is observed in the dog after antrectomy and that a decrease is known to occur in humans is a species difference and is not related to the pouch method of study used in earlier studies of the antrectomized dog.

5367 PARTICIPATION OF THE JEJUNUM AND ILEUM IN POSTPRANDIAL GASTRIC SECRETION IN MAN.

(Eng.) Clain, J. E.; Malagelada, J. R.; Go, V. L. W.; Summerskill, W. H. J. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 73(2):211-214; 1977.

To determine the role of the small intestine in postprandial gastric secretory function, gastric functions were determined in six healthy subjects after diversion of intestinal chyme at the angle of Treitz and during normal digestion. A standard meal containing polyethylene glycol marker was given by gastric tube. The meal was diverted by means of an occlusive balloon. The chyme was entirely diverted by siphonage immediately proximal to the balloon. In control experiments, chyme was reinfused on the distal side of the balloon, and in the diversion experiments, saline was reinfused. Diversion of chyme decreased postprandial gastric secretory volume and acid output by approximately one-fourth; this was primarily evident during the first hour. The integrated 3-hr postprandial serum gastrin response after diversion (703 ± 199 pg) was not significantly different ($p>0.05$) from that of the controls (562 ± 133 pg). It is concluded that the small intestine contributes appreciably to the magnitude of gastric secretory responses to meals.

5368 CANINE GASTRIC ACID SECRETION AND BLOOD FLOW MEASUREMENT IN HEMORRHAGIC SHOCK.

(Eng.) Shirazi, S. S.; Mueller, T. M.; Hardy, B. M. (Univ. Iowa Hosp. and Clinic, Iowa City, IA 52242). *Gastroenterology* 73(1):75-78; 1977.

The effect of hemorrhagic shock on total and regiona gastric blood flow was investigated in five anesthetized and five conscious dogs; the effectiveness of retransfusion in restoring the blood flow to the stomach was also investigated. Gastric blood flow was measured with 15-μ labeled microspheres. Acid secretion and regional flow under control conditions (mean blood pressure [BP]=100 mm Hg), after 1 hr of hemorrhagic shock (mean BP=40 mm Hg), and 60 min after retransfusion of shed blood (mean BP= 100 mm Hg) were measured. The hydrogen ion secretion dropped significantly, from 0.63 ± 0.01 to 0.18 ± 0.02 mEq/hr in anesthetized dogs and from 2.1 ± 0.5 to 0.11 ± 0.01 mEq/hr in conscious dogs when shock was induced. Retransfusion of blood increased the rate of acid secretion in both groups the degree of increase was not significant in the anesthetized group. Fundic mucosal blood flow (FMBF) was 35 ± 1.9 ml/min/100 g tissue for the control period in anesthetized dogs and 94 ± 10 ml/min for conscious dogs. The flow dropped to 9 ± 1.8 ml/min in anesthetized dogs and to 23 ± 8 ml/min in conscious dogs with the induction of shock. The control FMBF was significantly higher in conscious dogs than in anesthetized dogs and significantly higher in conscious dogs during shock than during shock in anesthetized dogs ($p<0.05$). In anesthetized dogs, the drop in resting antral mucosa blood flow (AMBF), from 30 ± 5.1 to 15 ± 2 ml/min for the shock period, was less than occurred in the fundic mucosa, and the difference between FMBF and AMBF for the shock period was significant ($p<0.05$). Retransfusion of blood increased the flow rate in both groups but did not restore it to resting levels. AMBF of conscious dogs was significantly higher than FMBF after retransfusion. Muscularis blood flow for fundus and antrum dropped with the induction of shock, and retransfusion increased the flow to less than the resting level. The perfusion of fundic mucosa is more sensitive to hemorrhagic shock, which may explain the propensity of stress ulcers to be located in the fundu

5369 EFFECTS OF FUNDIC DISTENTION ON PENTAGASTRIN-STIMULATED GASTRIC ACID SECRETION IN MAN.

(Eng.) Grotzinger, U.; Bergegardh, S.; Olbe, L. (Kantonsspital, CH-4004 Basel, Switzerland *Gastroenterology* 73(3):447-452; 1977.

The acid secretory effect of combined stimulation by balloon distention of the fundus and body of the stomach and infusion of pentagastrin was studied in patients with duodenal ulcer (DU) and in healthy subjects. In eight nonoperated DU patients and in five DU patients subjected to proximal gastric vagotomy, low grade fundic distention moderately enhanced the acid output evoked by a threshold dose of pentagastrin (0.5 or 1.6 μg/hr; basal, pentagastrin-stimulated, and pentagastrin + distention-stimulated secretion 3.17 ± 0.57, 4.45 ± 0.66, and 5.81 ± 0.81 mmol/15 min, resp.). Fundic distention with a balloon volume eliciting a maximal acid response to distention either left unchanged or suppressed the maximal acid secretory rate produced by pentagastrin in seven nonoperated and six vagotomized DU patients and in five healthy subjects. The heterogeneous secretory effects of maximal stimulus combination suggest that fundic distention has a complex action on acid secretion eliciting a hitherto unknown inhibitory effect as well as a cholinergic activation of the parietal cell area. This complex action may explain the failure of fundic distention to augment markedly the action of pentagastrin in this study.

5370 EXPERIMENTAL STUDY ON GASTRIC SECRETION AFTER MASSIVE SMALL BOWEL RESECTION. (Jpn.) Kano, Y. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Shikoki Acta Med.* 32(1):45-60; 1976.

Gastric secretion was studied in Heidenhain pouch dogs with either a two-thirds proximal or two-thirds distal small bowel resection. The dogs with proximal bowel resection had a more prominent decrease in body weight than did those with distal resection. The basal fasting levels of pouch acid secretion and of serum gastrin were similar in the two groups. The volume output, acidity, and total acid output increased markedly 2 hr after feeding in the dogs with proximal bowel resection. During the 6 hr following feeding, the volume output increased by an average of 138%, and the total acid output increased an average of 268%. Pouch secretion in the animals with distal resection was similar to that in controls without resection. The serum gastrin level after feeding increased with time in the dogs with proximal resection and decreased with time in those with distal resection. Pouch secretion and serum gastrin levels were similar in dogs with proximal resection alone and with proximal resection with vagotomy. The numbers of parietal cells, gastric epithelial cells, and villi of the residual small intestine increased in the animals with increased gastrin levels.

5371 ASPIRIN AND GASTRIC ULCERATION: LIGHT AND ELECTRON MICROSCOPIC OBSERVATIONS IN A MODEL OF ASPIRIN PLUS STRESS-INDUCED ULCEROGENESIS. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., G.P.O. Box 252C, Hobart, Tasmania, Australia, 7001). *Br. J. Exp. Pathol.* 58(2):215-219; 1977.

5372 SERUM GASTRIN LEVELS IN INFANTS AND CHILDREN. (Eng.) Janik, J. S.; Akbar, A. M.; Burrington, J. D.; Burke, G. (Cook County Hosp., 1825 W. Harrison St., Chicago, IL 60612). *Pediatrics* 60(1):60-65; 1977.

5373 SIGNIFICANCE OF GASTRIC MUCOSAL PEPSINOGEN AND PLASMA CORTICOSTEROID LEVELS IN THE COURSE OF CINCHOPHEN ULCERATION. (Eng.) Nagamachi, Y. (Gunma Univ. Sch. Medicine, 3-39-15 Showamachi, Maebashi, 371 Japan). *Gastroenterol. Jpn.* 12(1):13-20; 1977.

5374 INFLUENCE OF SOME SYMPATHOMIMETIC AMINES ON THE EXPERIMENTAL GASTRIC ULCERS IN RATS. (Eng.) Cuparencu, B.; Sandor, V. (Medical and Pharmaceutical Inst., Cluj-Napoca, Rumania). *Pharmacoolgy* 15(3):218-226; 1977.

5375 EFFECTS OF NOREPINEPHRINE AND PHENTOLAMINE ON FROG GASTRIC MUCOSA IN CHLORIDE SOLUTIONS. (Eng.) Rose, J.; Schwartz, M.; Farmer, J. M.; Carrasquer, G. (Univ. Louisville Health Sciences Center, Louisville, KY 40201). *Proc. Soc. Exp. Biol. Med.* 155(1):59-63; 1977.

5376 MODIFICATION OF THE ACTION OF PENTAGASTRIN ON ACID SECRETION BY BOTULINUM TOXIN. (Eng.) Kondo, T.; Magee, D. F. (Sch. Medicine, Creighton Univ., 2500 California St., Omaha, NB 68178). *Experientia* 33(6):750-751; 1977.

5377 INHIBITION OF GASTRIC K^+ ATPase BY PHENYLBUTAZONE AND INDOMETHACIN. (Eng.) Spenney, J. G.; Mize, K. S. (Dept. Medicine, Univ. Alabama in Birmingham, Birmingham, AL). *Biochem. Pharmacol.* 26(13):1241-1245; 1977.

5378 REGULATION OF GASTRIC ACID SECRETION. (Eng.) Debas, H. T. (Faculty Medicine, Univ. British Columbia, Vancouver, British Columbia X5Z IL5, Canada). *Fed. Proc.* 36(7):1933-1937; 1977.

5379 ADENYLYL CYCLASE AND GASTRIC ACID SECRETION. (Eng.) Thompson, W. J.; Rosenfeld, G. C.; Jacobson, E. D. (Univ. Texas Medical Sch. at Houston, Houston, TX 77025). *Fed. Proc.* 36(7):1938-1941; 1977.

5380 GASTRIN HETEROGENEITY: BIOLOGICAL SIGNIFICANCE. (Eng.) Walsh, J. H. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Fed. Proc.* 36(7):1948-1951; 1977.

5381 CHANGES IN GASTRO-INTESTINAL SEROTONIN CONTENT ASSOCIATED WITH FASTING AND SATIATION. (Eng.) Biggio, G.; Piccardi, M. P.; Porceddu, M. L.; Gessa, G. L. (Inst. Pharmacology, Univ. Cagliari, via Porcell 4, I-09100 Cagliari, Italy). *Experientia* 33(6):745-746; 1977.

5382 EFFECT OF TRIMIPRAMINE (SURMONTIL) ON GASTRIC SECRETION OF ACID AND PEPSIN IN MAN. (Eng.) Roland, M.; Berstad, A.; Myren, J.; Liavag, I. (Aker Univ. Hosp., Oslo 5, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 43):19-25; 1977.

5383 THE EFFECT OF TRIMIPRAMINE (SURMONTIL) ON GASTRIC SECRETION AND THE SERUM GASTRIN RELEASE IN HEALTHY YOUNG STUDENTS. (Eng.) Bohmann, T.; Schrumpf, E.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 43): 7-17; 1977.

5384 BIOASSAY AND RADIOIMMUNOASSAY OF GASTRIN AND SIGNIFICANCE OF GASTRIN DEGRADATION PRODUCTS. (Eng.) Lewin, M. R.; Wyllie, J. H. (Univ. Coll. Hosp., University St., London, WC1E 6JJ, England). *Eur. Surg. Res.* 9(3):166-172; 1977.

See also, 5282, 5325, 5326, 5330, 5332, 5333, 5335, 5352, 5353, 5478, 5488, 5494, 5501, 5502, 5554, 5593, 5618, 5622, 5623, 5624, 5628, 5633, 5636, 5641, 5645, 5647.

SECRETION AND METABOLISM

Pancreas

5385 SECRETION OF LABELLED PROTEINS BY THE ISOLATED DOG PANCREAS IN THE RESPONSE TO SECRETIN AND CHOLECYSTOKININ. (Eng.) Laval, J.; Frexinos, J.; Laval, J. P.; Ribet, A. (Groupe de Recherche de Biologie et Pathologie Digestive, INSERM, U-151, CHU Rangueil, Chemin du Vallon, Bat. L3, 31400 Toulouse, France). *Biomedicine* 26(1):65-70; 1977.

The effects of secretin alone (10 clinical U/hr) and secretin (same dose) plus cholecystokinin-pancreozymin (CCK-PZ, 10 Ivy U/hr) on the secretion of radioactively labeled proteins in the pancreatic juice from isolated dog pancreas perfused *ex vivo* with whole heparinized oxygenated blood were compared. The average values for protein output showed the same pattern for both types of stimulation. After a washing out period, protein outputs were constant from about the 30th min onwards in the experiment. However, the average protein output was two- to threefold higher under the influence of CCK-PZ plus secretin (3-4 mg/min) than with the secretin alone (1-2 mg/min). Both types of stimulation caused an increase in pancreatic secretory flow rate 10 min after the start of infusion, with the secretory flow rates leveling out 20-30 min later and diminishing after the 60th min. With both types of stimulation, radiolabeled proteins appeared in the pancreatic juice about 20-25 min after the injection of leucine tracer. The secretion of labeled proteins, which reflected the biosynthesis, transport, and secretion of the enzymes, increased linearly until the 55th min after tracer injection, corresponding to the plateau of the protein output. The average value of maximum radioactivity was three times higher under the influence of CCK-PZ plus secretin than with secretin alone. The time course of protein specific radioactivity indicated that during the 50 min following tracer injection both treatments had an identical action. Afterwards, CCK-PZ plus secretin treatment produced a maximum in protein specific radioactivity in the pancreatic juice that was lower and occurred later than with secretin alone. It is concluded that CCK-PZ and perhaps secretin act on the synthesis and transport of the secretory proteins of the exocrine pancreas.

5386 PLASMA SECRETIN AND PANCREATIC BICARBONAT RESPONSE TO EXOGENOUS SECRETIN IN MAN. (Eng.) Hacki, W. H.; Bloom, S. R.; Mitznegg, P.; Domschke, W.; Domschke, S.; Belohlavek, D.; *et al.* (Royal Postgraduate Medical Sch., London W12 OHS, England). *Gut* 18(3):191-195; 1977.

To help clarify the physiological role of secretin, the dose response of duodenal bicarbonate productio during synthetic porcine secretin infusions was studied in six healthy subjects and related to plasma secretin immunoreactivity. Secretin was infused in each subject at four different doses (from 0.1-2.7 clinical U/kg/hr), each infusion lasting 60 min. The mean maximal bicarbonate secretion was 33 ± 4 mEq/hr. The ratio of the mean incremental plasma secretin levels at the different infusion rates were 1:2.8:10.0:30.5, reflecting very closely the grading of the infusion secretin content. At the end of the last infusion, there was a rapid fall in the plasma secretin to only 8% of the maximal increment after 10 min. The half-life of secretin was estimated at approximately 2.8 min. The secretin plasma level for half-maximal bicarbonate response was estimated to be 22 pmol/l. As this level is reported to be achieved by intraduodenal acidification in man, it is concluded that secretin may play a part in the control of duodenal pH.

5387 PANCREATIC BICARBONATE, SERUM GASTRIN, AND SECRETIN RESPONSES TO MEALS VARYING IN pH. (Eng.) Llanos, O. L.; Konturek, S. J.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Physiol.* 233(1):E41-E46; 1977.

To investigate the role of secretin in the postprandial bicarbonate response of the pancreas, secretin and bicarbonate secretion were studied in dog

h gastric and pancreatic fistulas after exo-
ous and endogenous acidification of meal. A
er extract meal at various pH levels was intro-
ed into the stomach and kept at the preselected
by intragastric titration. Gastric acid, pan-
atic bicarbonate, serum gastrin, and plasma
retin were measured. The meal at pH 7 produced
increase of gastrin levels 230% above basal
a gastric acid output of 16.9 mEq/30 min, com-
ed to a basal level of 0.8 mEq/min. Acidifica-
n of the meal evoked a pH-dependent reduction of
trin and gastric acid secretion, a pH-dependent
vation of pancreatic bicarbonate, and signifi-
t elevation of secretin at pH 3 (43% above basal)
at pH 2 (80% above basal). Postprandial endo-
ous acidification of a meal, without intragas-
c titration, also provoked significant release
secretin. Maximal pancreatic bicarbonate secre-
n in response to exogenous secretin was augmented
by the addition of a liver extract meal at pH
It is concluded that, in dogs with pancreatic
tulas, a meal exogenously or endogenously (post-
ndial) acidified is capable of stimulating the
ease of secretin in immunoassayable amounts.
normal pancreatic bicarbonate response to food
depend partially upon potentiation of the
retin effect by other neurohumoral stimuli.

8 VASOACTIVE INTESTINAL PEPTIDE: A SECRETIN-LIKE PARTIAL AGONIST FOR PANCREATIC SECRE-
N IN MAN. (Eng.) Domschke, S.; Domschke, W.;
ch, W.; Konturek, S. J.; Sprugel, W.; Mitznegg,
et al. (Dept. Medicine, Univ. Erlangen-Nurnberg,
nkenhausstrasse 12, D-8520 Erlangen, W. Germany).
troenterology 73(3):478-480; 1977.

responses of pancreatic volume flow and bicar-
ate output to i.v. vasoactive intestinal peptide
P, 0.8-3.2 μg/kg/hr) were compared to those ob-
ned with synthetic secretin (32.2-129 ng/kg/hr)
five healthy volunteers. Pure pancreatic juice
obtained by endoscopic cannulation of the main
creatic duct. The mean observed maximal response
secretin-stimulated juice flow was 248 ± 7 μl/kg/
in, whereas the observed maximal response for VIP-
ked juice flow was 48 ± 6 μl/kg/5 min. The ob-
ved maximal secretin-induced bicarbonate output
30 ± 2 μEq/kg/5 min, and the maximal VIP-related
sponse was 4.3 ± 0.9 μEq/kg/5 min. In addition
low efficacy, the high dose requirements and side-
fects (significant rise in pulse rate and cutaneous
shing at 3.2 μg/kg/hr) argue against a major
ysiological role of VIP as a hormonal stimulant
human pancreatic bicarbonate secretion.

39 EFFECT OF VINBLASTINE ON PANCREATIC EN-ZYMES SECRETION INDUCED BY CYCLIC NUCLEO-
DE DERIVATIVES. (Eng.) Stock, C.; Launay, J.
; Grenier, J. F.; Bauduin, H. (Unite 61 de
INSERM de Biophysiopathologie de l'Intestin,
57200 Strasbourg, France). *Experientia* 33(8):
56-1068; 1977.

investigate the possible participation of micro-
bules in the secretory response of the pancreas
cyclic nucleotide derivatives, the effects of
the mitotic spindle-inhibitor, vinblastine, on both the function and the ultrastructure of the acinar cell were examined. Vinblastine (5×10^{-5} M) induced the disappearance of microtubules accompanied by the appearance of paracrystalline deposits in the cytoplasm of rat acinar cells. Increased amylase and lipase release by the *in vitro* pancreas treated with 1 mM dibutyryl cyclic AMP alone or in combination with 5×10^{-5} M vinblastine was confirmed by the observation of numerous pictures of exocytosis at the apex of the acinar cells as well as the presence of a dense secretory material in the acinar lumina. Dibutyryl cyclic guanosine monophosphate (1 mM) and vinblastine did not significantly affect the spontaneous release of enzymes, either alone or in combination. Dibutyryl cyclic guanosine monophosphate alone or associated with vinblastine did not modify the secretory response to dibutyryl cyclic AMP. The results support the previous suggestion that dibutyryl cyclic AMP stimulates enzyme release from the pancreas through a direct interaction with the acinar cell.

5390 THE EFFECT OF HYOSCINE-n-BUTYLBROMIDE ON EXOCRINE PANCREATIC SECRETION. (Eng.)

Odes, H. S.; Helman, C. A.; Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 52(1):17-19; 1977.

The effect of hyoscine-*N*-butylbromide on secretin-stimulated pancreatic secretion was studied in 10 men who were being evaluated for possible pancreatic disease. Each patient underwent two 80-min pancreatic function tests in tandem, the tests being separated by an interval of 30 min. Secretin (2 U/kg, i.v.) was administered before each test, and cholecystokinin-pancreozymin (CCK-PZ, 1.5 U/kg) was administered at the end of the first hour. Hyoscine-*N*-butylbromide (40 mg, i.v.) was administered before the second test. The volume output after secretin stimulation was not affected by hyoscine-*N*-butylbromide, but a significant increase in the mean bicarbonate concentration occurred (72 ± 6 mEq/l before, 92 ± 5 mEq/l after, $p<0.01$). There were also significant reductions in total protein (10.9 ± 0.9 versus 4.2 ± 0.5 mg/ml, $p<0.001$), trypsin (2.2 ± 0.2 versus 1.1 ± 0.1 benzylarginine ethyl ester U x 10^3/ml, $p<0.001$), and amylase (4.8 ± 0.9 versus 2.4 ± 0.4 U x 10^3/ml, $p<0.01$). Hyoscine-*N*-butylbromide produced no significant changes in CCK-PZ-stimulated volume output and bicarbonate, protein, trypsin, and amylase concentrations.
The use of hyoscine-*N*-butylbromide as a duodenal relaxant before the collection of pancreatic juice during retrograde endoscopic pancreatography may lead to a low estimation of secretin-stimulated secretion.

5391 EFFECTS OF CHRONIC ETHANOL CONSUMPTION ON PANCREATIC RESPONSE TO CENTRAL VAGAL STIMULATION BY 2-DEOXY-D-GLUCOSE IN THE RAT. (Eng.)

Chariot, J.; Roze, C.; de La Tour, J.; Souchard, M.; Hollande, E.; Vaille, C.; Debray, C. (Hopital Bichat, 170 bd Ney, F-75877 Paris Cedex 18, France). *Digestion* 15(5):425-437; 1977.

The effects of chronic ethanol consumption on the pancreatic response to central vagal stimulation by 2-deoxy-*D*-glucose (2DG; 75 or 225 mg/kg, i.v.) were investigated in male Wistar rats given a 20% ethanol solution in drinking water *ad libitum* for 3 months. Basal sodium secretion (-30%, $p<0.001$), bicarbonate (-35%, $p<0.001$), and total protein (-35%, $p<0.001$) were depressed in alcoholic versus control rats. Pancreatic response was identical in both groups with the smaller dose of 2DG, dose related in controls, and identical for both doses in alcohol-fed rats. The response was thus significantly smaller in alcohol-fed rats than in controls for the larger dose of 2DG ($p<0.01$). Pancreatic concentration and contents of amylase, trypsinogen, chymotrypsinogen and lipase were all decreased 40-60% in alcoholic versus control rats ($p<0.001$). These results are consistent with the hypothesis of functional modifications in pancreatic cholinergic innervation in alcohol-fed rats.

5392 EXOCRINE PANCREATIC SECRETION INDUCED BY INGESTION OF A MEAL: STUDIES IN PURE PANCREATIC JUICE OBTAINED FROM EXTERNAL PANCREATIC FISTULAS. (Eng.) Ribera, M. T.; Leitao, C. N. (Hosp. de San Pablo, Barcelona 13, Spain). *Am. J. Gastroenterol.* 67(2):131-134; 1977.

5393 SUPPRESSION OF THE EXOCRINE FUNCTION AS A AID TO OF [sic] SEGMENTAL PANCREATIC TRANSPLANTATION IN DOGS. (Eng.) Dubernard, J. M.; Traeger, J.; Neyra, P. (Hopital E. Herriot, Place d'Arsonval, 69374 Lyon Cedex 2, France). *Biomedicine* 27(4):172-174; 1977.

5394 IN-SITU-ISOLATED PERFUSED RAT PANCREAS: A NEW METHOD FOR PHARMACOLOGICAL STUDIES OF THE EXOCRINE PANCREAS. (Eng.) Tournut, R.; Estival, A.; Vaysse, N.; Pascal, J. P.; Ribet, A. (INSERM U-151, Batiment L3, CHU Rangueil, Chemin du Vallon, F-31400 Toulouse, France). *Digestion* 15(4):329-337; 1977.

See also, 5266, 5272, 5352, 5353, 5358, 5433, 5442, 5443, 5445, 5457, 5481, 5482, 5494, 5519, 5529, 5773.

SECRETION AND METABOLISM

Hepatobiliary Tract

5395 PRELIMINARY TRIAL OF A NEW TEST FOR THE ASSESSMENT OF LIVER CELL FUNCTION: THE TMB TEST. (Fre.) Rousselet, F.; Charbonnier, A.; Fredj, G.; Nepveux, P.; Fluteau, G.; Cachin, M. (Centre d'Enseignement Pharmaceutique, Universite Rene Descartes, 4, avenue de l'Observatoire, 75006 Paris, France). *Sem. Hop. Paris* 53(18/19):1049-1051; 1977.

Liver cell function was assessed by administration of trimethoxy-1,3,5-benzene (TMB, 400 mg, p.o.) and measurement of its metabolites, mainly dimethoxy-1, 3-hydroxy-5-benzene (DMHB), excreted in the urine after 0-3 hr (a fraction), 3-7 hr (b fraction), and 7-24 hr (c fraction). Values were obtained from 17 healthy subjects, followed by a blind study of 48 patients with various digestive illnesses. Hepatic disorders showed a delay or diminution in the total excretion of DMHB, with the values for the a fraction being most affected. The test was positive in 31/32 patients with previously diagnosed liver disease. The results were significant for liver cirrhosis ($p<0.00001$), alcoholism ($p<0.001$), liver disorders ($p<0.0000001$), and secondary tumors of the liver ($p<0.05$). Abnormal results were also obtained in 11 other patients whose routine liver function tests were normal, but whose diseases were concomitant with mild liver disturbances. The TMB technique promises to be a sensitive test for subclinical and laboratory-negative liver failure.

5396 STUDIES ON METABOLISM OF ANTIBIOTICS. I. BIOTRANSFORMATION OF CEPHALOTHIN (CET) IN PATIENTS AND ANIMALS WITH LIVER IMPAIRMENT. (Jpn.) Komatsu, T. (Hokkaido Univ. Sch. Medicine, Sapporo, Japan). *Chemotherapy* 25(4):555-564; 1977.

The metabolism of cephalothin (CET) was studied in humans and rats with and without liver disease. Thin layer chromatography and autoradiography were used to study the transformation of CET to its main metabolite, desacetyl-CET (DA-CET). Acute liver injury was produced in rats by the administration of CCl_4 for 3 days, and chronic injury (liver cirrhosis) was induced by administration for 5 months. Untreated controls and the rats with liver injury received an i.v. injection of CET (100 µg/kg). In controls, the biliary excretion of DA-CET decreased from 1,610 µg/ml at 1 hr after CET injection to 346.7, 56.0, and 12.5 µg/ml at 2, 3, and 4 hr, resp. In rats with acute liver injury, the respective values were 1,342.5, 72.0, 5.4, and 7.1 µg/ml, and in rats with chronic liver injury, they were 400, 135, 30.3, and 10.8 µg/ml. Four hours after injection, the DA-CET levels in the urine were 25,000, 19,500, and 10,300 µg/ml in the control the rats with acute injury, and the rats with chronic injury, resp. The activity of CET-desacetylase was found to be highest in the cytosol fraction of liver homogenates of control rats, but the activity in this fraction decreased in the rats with liver

jury, particularly in those with liver cirrhosis.
rum SGOT, SGPT, alkaline phosphatase, and γ-globu-
n levels were increased and aspirin esterase and
enylacetate esterase levels were decreased in the
ts with liver injury. Paranitrophenylacetate
terase activity was highest in the lysosomal and
tochondrial fractions, and both aspirin esterase
d phenylacetate esterase activities were highest
the microsomal fraction in the controls; these
tivities decreased in rats with liver injury. The
ver diseases in the human subjects included liver
rrhosis, chronic hepatitis, fatty liver, and obstruc-
ve jaundice. The ratio of CET/DA-CET in 2-hr
ine collections and the urinary recovery of CET
hr after CET administration were not significantly
fferent in the patients and in controls without
ver impairment. There was no correlation between
e ratio of CET/DA-CET and parameters of liver
nction.

97 STUDIES ON METABOLISM OF ANTIBIOTICS. II.
BIOTRANSFORMATION OF RIFAMPICIN (RFP) IN
TIENTS AND ANIMALS WITH LIVER IMPAIRMENT. (Jpn.)
matsu, T. (Hokkaido Univ. Sch. Medicine, Sapporo,
pan). *Chemotherapy* 25(4):565-574; 1977.

e metabolism of rifampicin (RFP) was studied in
tients with liver diseases (cirrhosis, chronic
patitis, fatty liver, obstructive jaundice, chole-
thiasis, and postcholecystectomy syndrome) and
guinea pigs with CCl_4-induced liver injury. The
imals received 0.1 ml of CCl_4, i.m. When RFP was
ministered p.o. (30 mg/kg), biliary and urinary
cretion of both RFP and its main metabolite, des-
etyl-RFP (DA-RFP), decreased to a greater extent
an in control animals without liver injury. The
P levels in the bile 1, 2, 3, and 4 hr after
ministration were 6.02, 13.34, 16.04, and 14.37
/ml, resp., in controls and 0.80, 3.71, 4.54, and
89 μg/ml in CCl_4-treated animals; the level in
e urine 4 hr after administration was 0.79 μg/ml
controls and 0 in the CCl_4-treated animals. The
-RFP levels in the bile of controls were 1.28,
65, 4.85, and 5.98 μg/ml at 1, 2, 3, and 4 hr,
sp., and 0, 0, 0, and 2.42 μg/ml in the CCl_4-treated
imals, resp.; there was no detectable DA-RFP in
e urine after 4 hr and the level in controls was
12 μg/ml. When RFP (2 mg/kg) was administered
v., only DA-RFP excretion in the urine and bile
creased in comparison with controls. In patients
th liver disease and in controls, the ratios of
P/DA-RFP in the urine 6 hr after the p.o. admin-
stration of 450 mg of RFP were similar. No posi-
ve correlations were found between the ratio of
P/DA-RFP and liver function tests.

98 THE MODE OF ACTION OF ALCOHOL ON THE HEP-
ATIC MICROSOMAL BIOTRANSFORMATION OF XENO-
IOTICS. (Fre.) Joly, J. G. (Hopital Saint-Luc, 1058.
e St.-Denis, Montreal, Quebec H2X 3J4, Canada).
ion Med. Can. 106(5):626-630; 1977.

ronic alcoholism is associated with cross toler-
nce between certain drugs, such as meprobamate,
d ethanol, with an increased tolerance to ethanol and with the potentiation of the action of some drugs, particularly sedatives, during inebriation. The first two phenomena are adaptive changes that result in a more rapid clearance of the exogenous substances. Electron microscopy has shown that the accelerated metabolic rate is due to the proliferation of the smooth endoplasmic reticulum of hepatocytes. This is accompanied by an increase in the levels of cytochrome P-450, NADPH-cytochrome P-450 reductase, and phospholipids. Alcoholism has been shown to lead to the appearance of a specific microsomal ethanol oxidizing system. Finally, when alcohol is present in the body, it slows down the metabolism of psychoactive drugs by competing for similar substrates, thereby lengthening the effect of these drugs.

5399 ORGAN CULTURE OF POSTNATAL RAT LIVER: EFFECTS OF ETHANOL ON LIPID METABOLISM.
(Eng.) Konrad, K. D.; Reed, G. B. (Cleveland Metropolitan General Hosp., 3395 Scranton Rd., Cleveland, OH 44109). *Exp. Mol. Pathol.* 26(3):425-433; 1977.

Organ culture explants of 3- to 5-day-old postnatal rat livers were used to examine the effect of ethanol on *in vitro* hepatocyte lipid metabolism. The livers were incubated with 1.0% ethanol (173 mM) for 6 hr. Lipogenesis, as measured by ^{14}C-acetate incorporation into explant lipids, and fatty acid esterification, measured by ^{14}C-palmitate incorporation into triglycerides, were both increased by ethanol administration; 1-^{14}C-palmitate incorporation was increased from 3,844 ± 188 to 1,905 ± 101 disintegrations per min (dpm) of $^{14}CO_2$/mg protein ($p<0.05$), and 1-^{14}C-acetate was increased from 123,422 ± 8,121 to 30,974 ± 3,689 dpm/mg ($p<0.005$). Production of $^{14}CO_2$ by the explants from ^{14}C-palmitate, ^{14}C-acetate, and ^{14}C-glucose was decreased following incubation with ethanol. Ethanol did not affect the release of labeled lipids from the explants into the media. Increases in the explant lactate pyruvate ratio during incubation with ethanol and incorporation of ^{14}C-ethanol into fatty acids indicated that the explants were oxidizing ethanol to acetate. Explant viability, as judged by ^{3}H-leucine incorporation into cellular protein and morphologic appearance by light and electron microscopy, was unaffected by incubation with 1.0% ethanol for up to 24 hr. Despite apparently increased lipogenesis and decreased fatty acid oxidation by the explants during ethanol administration, no statistically significant ethanol-induced increases in explant triglyceride or fatty acid concentration were found, unless the explants were incubated with media supplemented to 25% serum as an exogenous lipid source. These results indicate that acute hepatic explant lipid accumulation during ethanol administration is due primarily to deposition of exogenous lipids, with increased lipogenesis contributing only minimally to the increased deposition of lipids.

5400 ADULT RAT HEPATOCYTES IN PRIMARY MONOLAYER CULTURE: ULTRASTRUCTURAL CHARACTERISTICS OF INTERCELLULAR CONTACTS AND CELL MEMBRANE DIFFERENTIATIONS. (Eng.) Wanson, J. C.; Drochmans, P.; Mosselmans, R.; Ronveaux, M. F. (Laboratoire de

Cytologie, Universite Libre de Bruxelles, 1000 Bruxelles, Belgium). *J. Cell. Biol.* 74(3):858-877; 1977.

The ultrastructural characteristics of the process of hepatocyte aggregation were analyzed under well-defined conditions of isolation and cell culture. Primary monolayer cultures were obtained in 60-mm petri dishes by incubating 3 x 10^6 isolated hepatocytes at 37 C in Dulbecco's medium supplemented with 17% fetal calf serum. Within 4 hr of plating, the isolated spherical cells were found to adhere to the plastic surface, to establish their first contacts by numerous intertwined microvilli, and to form new hemidesmosomes. After 12 hr of culture, wide branched trabeculae of flattened polyhedral cells extended in all directions. Finally, after 24 hr of culture, bile canaliculi were reconstituted, and a biliary polarity was recovered. The Golgi elements, which were scattered throughout the cytoplasm in the isolated cells, were reassembled in front of the newly formed bile canaliculi, symmetrically in the adjacent cells; lysosomes were concentrated in that region, and microtubules reappeared. Concomitantly, plasma membrane differentiations, namely desmosomes and tight junctions, developed. Tight junctions sealing the bile ducts constituted a barrier to the passage of ruthenium red and horseradish peroxidase. *De novo* formation of these junctions was studied by the freeze-etching technique. Ten-nanometer particles composed a network of anastomosed linear arrays in the vicinity of the bile canaliculi; in the next step of differentiation, the particles fused, formed short ridged segments, and finally formed continuous branched smooth strands, characteristic of the mature tight junction.

5401 IN VITRO SPECTRAL ALTERATION OF HEPATIC CYTOCHROME P-450 BY EXPERIMENTAL DRUG INJURY. (Eng.) Willson, R. A.; Hart, F. E. (Harborview Medical Center, 325 9th Ave., Seattle, WA 98104). *Res. Commun. Chem. Pathol. Pharmacol.* 17 (4):605-621; 1977.

Hepatic microsomes from normal and phenobarbital (75 mg/kg)-treated rats were incubated *in vitro* with dimethyl sulfoxide (DMSO), dimethyl formamide (DMF), or Triton X-100 to assess the effects of these solvents on cytochrome P-450 content. Incubations were carried out in the presence and absence of an NADPH generating system. Dose-response curves of DMSO, DMF, and Triton X-100 revealed that cytochrome P-450 content decreased with increasing concentrations of each solvent, when compared with a phosphate buffer. When acetaminophen (0.036 M) was added to the phosphate buffer or to the DMSO, there was no change in the cytochrome P-450 content when compared with their respective controls. However, at 0.14 M acetaminophen or greater, there was a significant decrease in cytochrome P-450 content, attendant with a prominent spectral peak at 420 nm. To ascertain whether nucleophilic compounds (i.e., glutathione, cysteamine, methionine, and cysteine) would prevent these spectral changes, they were investigated both *in vivo* and *in vitro*. None prevented the decrease in cytochrome P-450 content or the presence of the spectral peak at 420 nm. These studies indicate that solvents alone may cause a diminished cytochrome P-450 content and this may be amplified in phenobarbital-induced microsomes. High concentrations of acetaminophen caused a large decrease of the cytochrome P-450 content than did the DMSO alone, and this was more pronounced in the induced microsomes. Since addition of nucleophilic compounds did not alter these spectral changes, the mechanism of the acetaminophen-associated change in cytochrome P-450 content is unclear.

5402 CONNECTIVE TISSUE FIBERS IN THE LIVER OF SQUIRREL, AFTER CARBON TETRACHLORIDE POISONING. A HISTOCHEMICAL STUDY. (Eng.) Rana, S. V. S. (Dept. Zoology, D.A.V. Coll., Muzaffarnagar, India). *Anat. Anz.* 141(2):126-129; 1977.

Connective tissue fibrils were studied histochemically in the carbon tetrachloride-damaged livers of ground squirrels. The experimental animals received CCl_4 (0.0037 ml) i.p. on alternate days for 1 month, while controls received olive oil (0.5 ml). CCl_4 treatment resulted in the formation of "balloon" cells, which had a clear cytoplasm and a retracted nucleus. Rings of elastin were found within these cells and in no other area, whil elastin was found exclusively in the blood vessels in normal liver. After prolonged CCl_4 treatment, no reticulin fibers were stained. Thick bundles of collagen covered the damaged liver lobule, while only negligible amounts of collagen were scattered throughout the normal liver.

5403 THE METABOLIC FATE OF n-ACETYL-D-[1-^{14}C]-GALACTOSAMINE IN ISOLATED PERFUSED RAT LIVER. (Eng.) MacNicoll, A. D.; Wusteman, F. S.; Powell, G. M.; Curtis, C. G. (Dept. Biochemistry, Univ. Coll., P.O. Box 78, Cardiff CF1 1XL, Wales). *Biochem. Soc. Trans.* 5(2):442-443; 1977.

In an attempt to identify the major route(s) for th re-utilization of monosaccharides, the metabolic fa of *N*-acetyl-D-[1-^{14}C]galactosamine was studied in the isolated perfused rat liver. The liver was perfused with homologous heparinized blood (100 ml) containing *N*-acetyl-D-[1-^{14}C]galactosamine (20 µCi 103 µg). After 6 hr, approximately 50% of the administered galactosamine was utilized by the liver for glycoprotein synthesis. These glycoproteins were secreted into plasma. The radioactive label was present predominantly in sialic acid and glucosamine (either free of *N*-acetylated). It appears that the epimerization step is a major event in the utilization of *N*-acetylgalactosamine in the isolate perfused rat liver.

5404 THE ROLE OF THE LIVER IN GLUCAGON METABOLISM. (Eng.) Jaspan, J. B.; Huen, A. H. J.; Moreley, C. G.; Moossa, R.; Rubenstein, A. H. (Dept. Medicine, Univ. Chicago, Chicago, IL 60637). *J. Clin. Invest.* 60(2):421-428; 1977.

To study the role of the liver in glucagon metabolism, total plasma immunoreactive pancreatic glucagon (IRG) was measured in samples taken simul-

aneously from the proximal portal vein and super-
ior vena cava of 26 healthy Sprague-Dawley rats.
he portal-peripheral ratio of IRG was 2.80 ± 0.25,
he portal-peripheral difference was 124 ± 15 pg/ml,
nd percent extraction was 58 ± 3. Gel filtration
f paired portal and peripheral vein samples showed
hat reduction in the 3,500-dalton IRG component
glucagon) in peripheral samples accounted for
lmost all the differences, there being minimal and
nconsistent changes in the high molecular weight
>40,000) fraction. The portal-peripheral ratio of
he 3,500-dalton glucagon was 5.24 ± 1.10, the
ortal-peripheral difference 130 ± 33 pg/ml, and
he percentage extraction 81 ± 5. To study the
ranshepatic differences in the 9,000-dalton "pro-
lucagon-like" material, the experiment was re-
eated in nine rats 24 hr after bilateral nephrec-
omy. The portal-peripheral ratio for plasma IRG
n these rats was 1.48 ± 0.12, the portal-peripheral
ifference 140 ± 29 pg/ml, and percentage extraction
8 ± 5. Gel filtration revealed no consistent
ifferences between portal and peripheral concen-
rations of the 9,000- and >40,000-dalton components,
hich comprised 40% and 13%, resp., of the mean IRG
evel of 492 ± 35 pg/ml. In contrast, there were
arked differences between portal and peripheral
evels of the 3,500-dalton component; the ratio
eing 3.42 ± 0.63; the portal-peripheral difference,
82 ± 32 pg/ml; and percentage extraction 64 ± 5.
imilar studies in a healthy dog, in which species
here are significant circulating levels of the
,000 dalton IRG component, confirmed the selective
epatic extraction of the 3,500-dalton fraction.

405 THE EFFECT OF AGE ON PROTEIN SYNTHESIS BY ISOLATED LIVER PARENCHYMAL CELLS.

(Eng.)
an Bezooijen, C. F. A.; Grell, T.; Knook, D. L.
Inst. Experimental Gerontology TNO, 151 Lange Klei-
eg, Rijswijk, Netherlands). *Mech. Ageing Dev.*
(4):293-304; 1977.

o investigate the effect of age on hepatic protein
ynthesis, the protein synthesizing capacity of
iver parenchymal cells isolated from 3-, 12-, 24-,
1-, and 36-month-old rats was determined by the in-
orporation of ^{14}C-leucine. Conditions for optimum
rotein synthesis included the use of an enriched
edium (modified Waymouth's MB 752/1) and cell sus-
ension concentrations ranging from 0.25 to 4 x 10^6
ells/ml medium. The cells were incubated with a
ose of 6 μmol leucine/ml medium for 2 hr at 37 C
nder an atmosphere of 95% O_2 and 5% CO_2. With par-
nchymal cells isolated from 3-month-old rats, a leu-
ine incorporation rate of 14.4 nmol leucine/hr/10^6
ells was found. The capacity of the parenchymal
ells to synthesize protein decreased between 3 and
2 months, remained constant between 12 and 24 months,
nd increased between 24 and 36 months. Degradation
f newly synthesized proteins or reutilization of
^{4}C-leucine did not occur during the incubation per-
od. The ratio between albumin and total protein
ynthesis as a function of age was determined. This
atio did not change between 3 and 24 months, but
here was a significant increase between 24 and 36
onths. The increase in total protein synthesis in
ate age may be due to a compensation by the liver for a more pronounced proteinuria, increased proteolysis, or an accumulation of "altered" proteins.

5406 FASTER SYNTHESIS AND SLOWER DEGRADATION OF LIVER PROTEIN DURING DEVELOPMENTAL GROWTH.

(Eng.) Conde, R. D.; Scornik, O. A. (Departamento de Quimica Biologica, Universidad de Buenos Aires, Buenos Aires, Argentina). *Biochem. J.* 166(1):115-121; 1977.

The liver protein gain during the early stages of postnatal development was studied *in vivo* in 4-day-old mice. At this age, liver protein accumulated at a rate of 18% per day. Synthesis was measured after the injection of massive amounts of radioactive leucine (0.01 μCi/μmol). Degradation was estimated as the balance between synthesis and accumulation of stable liver proteins, or from the disappearance of radioactivity from liver protein previously labeled by the administration of NaH-$^{14}CO_3$. The neonatal livers synthesized 39% as much protein per unit time and unit mass as adult tissue, which was accounted for by a higher ribosome concentration (synthesis/mg RNA was the same). These livers retained 39% of the newly synthesized protein as stable liver components (compared with 48% in adult mice) and degraded protein at 56% of the rate in the adult liver. This lower rate of degradation is quantitatively the most significant difference between the growing and non-growing liver.

5407 ISOLATION OF A NON-THIONEIN COPPER-BINDING PROTEIN FROM LIVER OF COPPER-INJECTED RATS.

(Eng.) Irons, R. D.; Smith, J. C. (Chemical Industry Inst. Toxicology, P.O. Box 12137, Research Triangle Park, NC 27709). *Chem. Biol. Interact.* 18(1): 83-89; 1977.

A low molecular weight, non-thionein, Cu-binding protein was isolated from rat liver and characterized. The protein was isolated following chronic administration of $Cu(NO_3)_2$ using a combination of Sephadex G-75 and Sephadex DEAE A-25 chromatography. The protein did not bind to fully equilibrated Sephadex DEAE, which formed the basis of the isolation procedure. The final protein preparation was found to be homogeneous by a variety of electrophoretic techniques and was distinguished from metallothionein on the basis of its behavior on ion exchange and electrophoretic systems, spectral properties, amino acid composition, and metal content. It contained 6.8% cysteine and was found to bind Cu in a ratio of 1.5:1 based on a molecular weight of 11,000. These results confirm the necessity of using techniques other than gel filtration alone to obtain adequate separation of low molecular weight metal-binding protein fractions.

5408 THYROID CALORIGENESIS IN ISOLATED, PERFUSED RAT LIVER: MINOR ROLE OF ACTIVE

SODIUM-POTASSIUM TRANSPORT. (Eng.) Folke, M.; Sestoft, L. (Inst. Medical Physiology, Dept. A, Univ. Copenhagen, Panum Inst., DK-2200 Copenhagen, Denmark). *J. Physiol. (Lond.)* 269(2):407-419; 1977.

The hypothesis that the calorigenic response to thyroid hormone is mainly due to increased energy utilization by the membrane-bound enzyme system ($Na^+ + K^+$)-activated adenosine triphosphatase (Na-K-ATPase) was examined. The effects of ouabain on hepatic oxygen uptake, cell membrane potential, and Na-K transport were examined at 37 C during nonrecirculating perfusion of isolated livers from fasted normal Wistar rats and rats treated with triiodothyronine (T_3, 50 μg/100 g). The perfusate was Krebs-Ringer bicarbonate buffer containing albumin and bovine RBC. Treatment with T_3 increased the rate of hepatic oxygen uptake by 30% (i.e., by 0.83 μmol/min/g liver). After shifting to perfusate containing 2.5 mM ouabain, a 4-5 mV depolarization and maximal rates of net hepatic K release and Na uptake occurred within 2 min in both thyroid states. These changes were not accompanied by any significant change in the rates of hepatic oxygen uptake. T_3-treatment increased the maximal, postouabain net flux of K by 29% (i.e., by 0.52 μEq/min/g liver). The T_3-induced increase in the net flux of Na (19%) did not achieve statistical significance. In either thyroid state, the observed passive fluxes of Na and K were calculated to be balanced by active fluxes at the expense of 5-6% of the observed rate of hepatic oxygen uptake. The results indicate that hyperthyroidism may enhance the rate of hepatic Na-K transport, but the energy expenditure due to this process appears to be too small to make any important contribution to thyroid calorigenesis in perfused rat liver.

5409 METABOLISM OF THYROID HORMONES BY CULTURED MONKEY HEPATOCARCINOMA CELLS: NONPHENOLIC RING DEIODINATION AND SULFATION. (Eng.) Sorimachi, K.; Robbins, J. (Clinical Endocrinology Branch, Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *J. Biol. Chem.* 252(13):4458-4463; 1977.

The metabolism of 3,5,3'-L-triiodothyronine (T_3) and L-thyroxine (T_4) was investigated in cultured hepatocytes (NCLP-6E) derived from a rhesus monkey hepatocarcinoma. Hormones labeled with ^{125}I in the phenolic ring were added to the medium of cell monolayers. After the addition of T_3, the concentration of ^{125}I in the medium fell to approximately 50% of the starting level within 30 min. At 37 C, but not at 4 C, this was followed by a rise to approximately 90% within 5 hr. Chromatographic analysis showed almost complete disappearance of T_3, and the sequential appearance of 3,3'-L-diiodothyronine (T_2), 3'-L-monoiodothyronine (T_1) and a component, which was shown by sulfatase treatment to be the phenolic sulfate conjugates of T_2 and T_1. The T_2 sulfoconjugate accounted for about 85% of the ^{125}I in the medium after 7 hr. ^{125}I-iodide accounted for less than 6% of the total radioactivity. At 4 C, no metabolites of T_3 were observed. T_4 was also metabolized by the cells at 37 C, but not at 4 C, although the rate was much slower. The major metabolite was 3,3',5'-L-triiodothyronine (rT_3). After 18 hr, approximately 40% of the ^{125}I in the medium was unaltered T_4, and about 20% and 15% were rT_3 and (T_2) sulfate, resp. ^{125}I-iodide accounted for approximately 20% of the total radioactivity. Labeled T_3 was not detected in the medium and accounted for no more than 1.5% of the intracellular radioactivity. After incubation of cells with ^{125}I-labeled rT_3 for 24 hr, 28% of the medium ^{125}I was T_2 sulfate, indicating that the major pathway for T_2 and I^- production from T_4 was via rT_3 deiodination. The metabolism of T_3 and T_4 was saturable, and was partially inhibited by either T_3 or T_4 at 10^{-8} M, and completely inhibited at 10^{-6} M. These results show that the NCLP-6E hepatocarcinoma cells were very active in carrying out nonphenolic ring deiodination of the thyroid hormones, as well as sulfoconjugation of the partially deiodinated products.

5410 CONCENTRATION AND DILUTION OF THE URINE IN PARTIALLY HEPATECTOMIZED, CONSCIOUS RATS. (Eng.) Perlmutt, J. H.; Kao, C. C.; Hill, P. K. (Dept. Physiology 206H, Univ. North Carolina, Chapel Hill, NC 27514). *Pfluegers Arch.* 369(3):233-238; 1977.

To determine whether renal impairment in patients with liver disease could be due to the deficiency of a factor normally produced by a healthy liver, the influence of partial hepatectomy on urinary concentrating ability and renal tissue sodium was determined in conscious Sprague-Dawley rats deprived of water for 24 hr. In comparison with a sham operation, partial hepatectomy resulted in: (a) a 50% reduction in free-water reabsorption, urinary osmolality, and osmolal urine-to-plasma ratio; (b) depression of free-water reabsorption at similar levels of osmolal clearance above 200 μl/min/ml of glomerular filtration rate during the infusion of hypertonic NaCl and vasopressin; and (c) a 30% reduction in sodium content of the renal papilla and outer medulla. The renal response to an i.v. water load (2.5% glucose infuse to 2.5% of body weight at 0.4 ml/min) was determined in sham-operated and partially hepatectomized conscious rats. By 60 min after the water load, both groups had excreted practically all of the load. However, during and for 30 min after the infusion in the partially hepatectomized group, the percentage of the water load excreted, urine flow, and free-water clearance was significantly reduced while urinary osmolality and osmolal urine-to-plasma ratio were significantly elevated. These experiments demonstrate that, shortly after partial hepatectomy, the renal concentrating ability is defective and the excretion of a water load is not grossly impaired.

5411 LONG-TERM STUDIES ON CHEMICALLY INDUCED LIVER ENLARGEMENT IN THE RAT. III. STRUCTURE AND BEHAVIOUR OF THE HEPATIC NODULAR LESIONS INDUCED BY PONCEAU MX. (Eng.) Grasso, P. Gray, T. J. B. (British Industrial Biological Res. Assoc., Woodmansterne Rd., Carshalton, Surrey, England). *Toxicology* 7(3):327-347; 1977.

Histological and biochemical changes in the livers of rats fed the disodium salt of 1-(2,4- or mixed xylylazo)-2-naphthol-3,6-disulphonic acid (Ponceau MX) were studied over a 2-yr period. Enlarged but histologically normal livers occurred in female Wistar rats fed 2.5% Ponceau MX for 5-30 weeks. Pathological changes consisted first of cell enlargement, then of abnormal glycogen deposits, and later of irregular areas of fatty change and nodular hyperplasia. After feeding Ponceau MX for 12 months, laparotomy was carried out. Approximately half the animals had no nodules at laparotomy or at autopsy after 9 months on a normal diet. The remaining animals had nodules ranging from 2 to 10 mm diameter at laparotomy, and all of these nodules had grown to 3-30 mm at the time of autopsy. Histologically, the smaller lesions consisted of single nodules made of regular cords of cells, and the larger lesions were comprised of a conglomeration of nodules, some of which were solid and others exhibited advanced fatty change. The solid nodules were made up of normal or enlarged cells that were either disposed in regular cords or formed papillary and adenoid structures. Such structures were associated with pulmonary metastases. Fibrous bands were occasionally present between nodules. ^{3}H-thymidine uptake was most pronounced in the solid nodules, both when the animals were maintained on Ponceau MX for 21 months and when treated for only the first 12 months. These investigations indicate that histological changes precede the appearance of hepatic nodules in Ponceau MX-treated rats, which suggests that they are initially of a reactive nature. Once established, the nodules continue to grow and may either develop fatty degeneration or become malignant.

5412 INFLUENCE OF DIETARY FATTY ACIDS ON LIVER AND ADIPOSE TISSUE LIPOGENESIS AND ON LIVER METABOLITES IN MEAL-FED RATS. (Eng.)

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As an approach to explaining the efficient inhibitory mechanism of polyunsaturated fatty acids on rat liver fatty acid synthesis, the concentration and composition of plasma unesterified fatty acids, the level of hepatic long chain acyl coenzyme A (CoA) esters, and liver cytosoloic redox state were quantitated in rats fed fat-free or fat-free plus 3% linoleate or linolenate diets. Sprague-Dawley rats were trained to eat a fat-free high carbohydrate diet from 0800 to 1100 hr each day. After adaptation to meal-eating, the fat-free diet was supplemented with 8% methyl stearate ($C_{18:0}$) or 3% methyl linoleate ($C_{18:2}$) for 7 days. In the fat-free group, hepatic utilization of acetate unit-equivalents (C_2 U) for fatty acid synthesis per mg soluble protein by the $C_{18:0}$ group was not significantly altered, whereas $C_{18:2}$ supplementation significantly depressed hepatic fatty acid synthesis (9.1 ± 0.7 nmol C_2 U/min/mg protein in fat-free versus 6.1 ± 0.7 nmol C_2 U/min/mg in 3% $C_{18:2}$). Supplemental $C_{18:2}$ also caused a significant decline in liver fatty acid synthetase and acetyl CoA carboxylase, while fat-free and $C_{18:0}$ groups displayed similar enzyme activities. Within a treatment, C_2 unit utilization for *in vivo* fatty acid synthesis was identical to that of acetyl CoA carboxylase and fatty acid synthetase activities *in vitro*. Therefore, shortly after a meal, the hepatic activities of these two enzymes appear to be functioning at near capacity. $C_{18:2}$ supplementation to the fat-free diet for 7 days caused a 25% decline in glucokinase and pyruvate kinase activities, but only pyruvate kinase was significantly depressed. In contrast, citrate cleavage enzyme and fatty acid synthetase were both significantly reduced in activity by 50%. Plasma unesterified fatty acid levels in rats fed $C_{18:2}$ for 5 days were not significantly elevated prior to a meal, although dietary $C_{18:2}$ did cause a fourfold rise in plasma free linoleate. Quantitation of long chain acyl CoA esters in freeze-clamped liver tissue of rats fed fat-free or fat-free plus 3% $C_{18:2}$ or $C_{18:3}$ diets revealed no concentration differences between treatments either before or after a meal. Similarly, lactate and pyruvate concentrations as well as the lactate:pyruvate ratios were not significantly changed by dietary $C_{18:2}$ or $C_{18:3}$. The inhibitory effects of $C_{18:2}$ or $C_{18:3}$ do not appear to be mediated through changes in total plasma free fatty acid levels, in total hepatic long chain acyl CoA concentration, or in hepatic cytosolic redox state.

5413 INTESTINAL REGULATION OF HEPATIC CHOLESTEROL SYNTHESIS: AN HYPOTHESIS. (Eng.)

Krumdieck, C. L.; Ho, K. J. (Univ. Alabama in Birmingham Medical Center, University Station, Birmingham, AL 35294). *Am. J. Clin. Nutr.* 30(2):255-261; 1977.

Evidence supporting the existence of an intestinal factor capable of stimulating hepatic cholesterogenesis is presented. When no food is present in the intestine, as during periods of total parenteral nutrition, both normal individuals and patients with familial hypercholesterolemia show a pronounced lowering of their serum cholesterol. For example, in a study with three patients with severe familial hypercholesteremia, the serum cholesterol level fell 23% (range, 19-44%) to a new lower baseline within 2 weeks of parenteral (i.v.) feeding. The loss of cholesterol during this period was estimated at about 5 g or 0.36 g/day. Such a reduction of body cholesterol is most likely attributable to a decrease of endogenous synthesis, since the fecal excretion of both neutral sterols and bile acids is diminished during i.v. feeding. Furthermore, if a portacaval shunt was performed after a postoperative regimen of i.v. alimentation, the lowered serum cholesterol level was sustained with a tendency for further decline. This observation suggests that a hypothetic intestinal factor capable of stimulating hepatic cholesterogenesis reaches the liver via the portal circulation and that, when carried first to the peripheral tissues through an artificial shunt, is either destroyed or diluted to the point where it loses its stimulatory activity upon returning to the liver. The function of this intestinal factor is to increase the synthesis of cholesterol whenever there is a need for increased amounts of intraluminal bile acids. The generation of the intestinal factor requires the presence of food in the intestine, and a diet rich in fat (but no cholesterol) should provide the best stimulus for the formation of the factor.

5414 CORRELATION BETWEEN SERUM LECITHIN-CHOLESTEROL-ACETYLTRANSFERASE ACTIVITY AND ERYTHROCYTE LIPID CONTENT DURING EXPERIMENTAL LIVER DAMAGE.

(Eng.) von Lehmann, B.; Grajewski, O.; Oberdisse, E. (Pharmakologisches Institut der Freien Universitat Berlin, Thielallee 69/73, D-1000 Berlin 33, W. Germany). *Naunyn-Schmiedebergs Arch. Pharmacol.* 298(3):211-216; 1977.

The relationship between lecithin-cholesterol-acyltransferase (LCAT) deficiency and RBC lipid content was studied in female Wistar rats with praseodymium-induced liver damage. The i.v. injection of 10 mg/kg praseodymium nitrate caused severe liver damage manifested by liver cell necroses, hepatic fat infiltration, and disturbances of serum lipid metabolism. Analysis of serum lipoprotein lipid content showed a contrasting behavior of the low and the high density lipoproteins. Unesterified cholesterol and phosphatidylcholine contents of the low density lipoproteins were slightly decreased 24 hr after praseodymium, followed by an eightfold increase after 96 hr. A pronounced diminution of unesterified cholesterol and phosphatidylcholine contents occurred in the high density lipoproteins within 24 hr, but returned to control values after 96 hr. In the RBCs, only phosphatidylcholine concentration was increased by about 30% at 72 hr. All other phospholipids showed a decrease followed by a normalization after 7 days. Unesterified cholesterol content of the RBC was not significantly altered. The serum lecithin-cholesterol-acyltransferase activity was inhibited by 90% 48-96 hr after administration of praseodymium. This inhibition was well correlated with the time course of RBC phosphatidylcholine content. Incubation of RBC with serum deficient in lecithin-cholesterol-acyltransferase activity enhanced the RBC phosphatidylcholine content. This alteration was independent of serum lipid concentrations. The incubation of RBCs from praseodymium-treated rats with serum containing normal lecithin-cholesterol-acyltransferase activity normalized the phosphatidylcholine content. The results indicate that serum lecithin-cholesterol-acyltransferase uses RBC phosphatidylcholine as a substrate, thus regulating the phospholipid pattern of the RBCs.

5415 7-KETOCHOLESTEROL: ITS EFFECTS ON HEPATIC CHOLESTEROGENESIS AND ITS HEPATIC METABOLISM IN VIVO AND IN VITRO.

(Eng.) Erickson, S. K.; Cooper, A. D.; Matsui, S. M.; Gould, R. G. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *J. Biol. Chem.* 252(15):5187-5193; 1977.

Because of the suggestion that 7-ketocholesterol may be used clinically in the treatment of familial hypercholesterolemias, the effects of this sterol on cholesterol biosynthesis and metabolism were investigated in intact rats and in the isolated, perfused rat liver. In the whole animal, 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase was inhibited by 60 to 70% after feeding 0.1% or 0.5% 7-ketocholesterol in the diet for 18 hr. However, after 66 hr of continuous feeding, inhibition was no longer significant, suggesting rapid development of tolerance to the sterol. In animals that showed significant inhibition of reductase activity, the levels of liver total cholesterol and microsomal cholesteryl esters had increased. In animals that had developed a tolerance for the sterol, these levels were normal, but microsomal cytochrome P-450 had increased, suggesting induction of mono-oxygenase systems for metabolism of the sterol. 7-Ketocholesterol had toxic effects when fed at levels of 0.5% in the diet, as indicated by decreases in live and body weights after 66 hr. The addition of 7-ketocholesterol (6 mg/100 ml) to the perfusate of the isolated livers also reduced the reductase activities, in comparison to controls ($p < 0.001$). In both the intact rat and the perfused liver, 7-keto[^{3}H]cholesterol was rapidly metabolized to more polar derivatives and to cholesterol itself, primarily in the microsomal fraction. In the perfused liver, the sterol and its metabolites were rapidly excreted in bile. The proportion of radioactivity in more polar metabolites increased with time, thus providing an explanation for the rapid development of tolerance. These results suggest 7-ketocholesterol is not promising as a hypocholesterolemic agent, although it is a useful probe in the investigation of cholesterol metabolism.

5416 ABSOLUTE DEPENDENCE OF CCL_4 INDUCED LOSS OF GLUCOSE-6-PHOSPHATASE AND CYTOCHROME P-450 ON LIPID PEROXIDATION.

(Eng.) Recknagel, R O.; Hruszkewycz, A. M.; Glende, E. A., Jr. (Sch. Medicine, Case Western Reserve Univ., 2119 Abingto Rd., Cleveland, OH 44106). *Panminerva Med.* 18(9/1 375-380; 1976.

The mechanism for CCl_4-induced glucose-6-phosphata (G-6-Pase) and cytochrome P-450 loss was investigated in isolated rat liver microsomes. Lipid per oxidation was prevented by carrying out the initia microsomal incubation under anaerobic conditions, and with EDTA. If lipid peroxidation was prevente during the anaerobic conversion of CCl_4 to $CHCL_3$, no detectable diminution of microsomal cytochrome P-450 or G-6-Pase occurred. When an exactly equivalent system was made aerobic, and with no added EDTA, cytochrome P-450 and G-6-Pase activities decreased markedly; lipid peroxidation occurred vigorously at this time. Cleavage of the CCl_3-Cl bon catalyzed by rat liver microsomes, was totally unable to produce any significant decrease in either cytochrome P-450 content of G-6-Pase activity, provided lipid peroxidation was present. The suggestion that covalent binding of cleavage products of CCl_4 metabolism may be the key event intervening between initial CCl_3-Cl bond cleavage and loss of cytochrome P-450 and G-6-Pase was investigated by studying the fate of the two enzymes during covale binding of ^{14}C from metabolism of $^{14}CCl_4$. For 120 min of incubation, during which there was extensive covalent binding of ^{14}C from added $^{14}CCl_4$, microsomal cytochrome P-450 and G-6-Pase activities were stable. The results indicate that CCl_3-Cl bond cleavage and covalent binding of carbon from CCl_4 do not, in and of themselves, constitute a mechanism for CCl_4-induced G-6-Pase and cytochrome P-450 loss; CCl_4-induced loss appears to require lipid peroxidation as an obligatory intermediate process.

5417 CHANGES IN LIVER COMPOSITION IN PHENOBARBITAL-INDUCED HEPATOMEGALY. (Eng.)

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To characterize the molecular changes associated with growth stimulation, the levels of poly(A)-RNA (heterogeneous nuclear RNA + cytoplasmic messenger RNA [mRNA]), total RNA, DNA, and protein were compared in untreated rats and those with phenobarbital (80 mg/kg/day, 3 days, i.p.)-induced hepatomegaly. Total poly(A)-RNA, isolated by phenol extraction and purified by affinity chromatography on oligo-(dT)-cellulose, was assayed for its template (messenger RNA) activity in a cell-free protein synthetic system derived from wheat germ. The cell-free system was sufficiently sensitive to detect differences of less than a microgram of mRNA when optimal concentrations of Mg^{2+} and K^+ were used. Using this system, no significant differences in the hepatic content of poly(A)-RNA were observed between the control and treated groups. The DNA level was also unchanged, but the liver weight was increased by 26% in the treated group. Total RNA and protein levels also increased significantly (25% and 38%, resp., per 100 g body weight, and 21% and 30%, resp., per unit of DNA) in the treated group. Protein levels, when expressed in terms of poly(A)-RNA, showed a significant (22%) increase in the treated group. These results suggest that phenobarbital-induced hepatomegaly: (a) is characterized by hypertrophy (cell enlargement), (b) is not mediated by a generalized increase in the level of poly(A)-RNA, but involves a generalized increase in the synthesis and/or stabilization of RNA other than functional message, and (c) involves an increased translation of mRNA *in vivo*.

5418 HEXOBARBITAL-OXIDATION IN VIVO AND IN VITRO IN RATS AFTER PHENOBARBITAL-PRETREATMENT OR AFTER PORTACAVAL ANASTOMOSIS. (Ger.)

Richter, E.; Gallenkamp, H.; Brachtel, D.; Grun, M. (Med. Univ.-Klinik Wurzburg, Josef-Schneider Strasse 2, 8700 Wurzburg, W. Germany). *Z. Gastroenterol.* 15(6):389-392; 1977.

Hexobarbital (HX) oxidation was measured *in vivo* and *in vitro* in male rats after phenobarbital (PB, 50-80 mg/kg for 5 days) pretreatment or after portacaval anastomosis. HX was given at 80 mg/kg i.v.; plasma levels were determined by gas chromatography, whereas HX clearance was calculated from the plasma concentration curve versus time. Liver microsomes were obtained after homogenization, and cytochrome P450 was measured. Microsomal HX metabolism *in vitro* was measured by substrate determination after 30 min incubation at a substrate concentration of 3×10^{-4} M and a NADPH concentration of 2×10^{-3} M in Tris-HCl buffer at pH 7.4. Following PB treatment, rats had an enlarged liver, markedly raised cytochrome P450 content, elevated NADPH-cytochrome-C-reductase activity, and an increased HX oxidation rate and clearance. After portacaval shunt, the animals had a small liver, reduced cytochrome P450 level, and reduced HX oxidation and clearance. The results suggest that HX clearance *in vivo* may be a good indicator for hepatic cytochrome P450 content and hepatic HX oxidation rate, as well as for determination of drug metabolism in the liver.

5419 BILE SECRETION IN SELECTIVE BILIARY OBSTRUCTION: ADAPTATION OF TAUROCHOLATE TRANSPORT MAXIMUM TO INCREASED SECRETORY LOAD IN THE RAT.

(Eng.) Adler, R. D.; Wannagat, F. J.; Ockner, R. K. (San Francisco Medical Center, San Francisco, CA 94143). *Gastroenterology* 73(1):129-136; 1977.

Bile secretory function was studied in rats with selective biliary obstruction (SBO), in which ligation of the bile ducts draining the median and left hepatic lobes obstructs about two-thirds of liver mass. In addition, the maximum secretory capacity (Tm) for taurocholate was measured in selectively obstructed rats and in rats with intact bile ducts and expanded bile acid pools. Forty-eight hours after SBO, serum total bile acid was increased 13-fold, and total bile acid concentration in the obstructed lobes of the liver was 3 times higher than controls, but biliary secretion of water, bile acids, cholesterol, and phospholipids by the nonobstructed lobes was similar to controls when expressed per 100-g rat. In the selectively obstructed rats, but not in controls, *Tm* increased 50% between 4 and 48 hr after surgery, and, when expressed per gram of nonobstructed liver, was 81% higher than controls at 48 hr (0.69 ± 0.06 versus 0.38 ± 0.02 μmol/min/g). The rise in *Tm* between 4 and 48 hr suggests that the augmentation of *Tm* in SBO rats at 48 hr represents an adaptive response rather than recruitment of immediately available secretory reserve. The mechanism for these alterations in *Tm* was investigated in rats with intact bile ducts subjected to intraduodenal taurocholate infusion for 48 hr. In these rats doubling of bile acid pool size and secretion rate was associated with a 50% increase in taurocholate *Tm*. These findings suggest that the maximum secretory capacity for bile acids is not fixed, but rather can adapt to a sustained increase in secretory load. This observation may provide the basis for further functional and structural clarification of the process of bile secretion.

5420 HEPATIC STORAGE AND BILIARY TRANSPORT MAXIMUM OF TAUROCHOLATE AND TAUROCHENODEOXYCHOLATE IN THE DOG.

(Eng.) Poupon, R.; Poupon, R.; Dumont, M.; Erlinger, S. (Hopital Beaujon, F 92110 Clichy, France). *Eur. J. Clin. Invest.* 6(6):431-437; 1976.

A study was undertaken to examine the validity of the multiple infusion technique, previously used for the study of hepatic BSP transport, and to obtain estimates of the relative storage capacities and secretory transport maxima for taurocholate (TC) and taurochenodeoxycholate (TCDC) in dogs. The endogenous bile acid pool was depleted and the bile was collected continuously. TC and TCDC were infused i.v. at three different rates, and serum bile acid concentrations were measured at intervals of 10 min. In the last 30 min of each infusion period, serum bile acid concentration changed linearly with respect to time, with linear correlation coefficients ranging from 0.95 to 0.99. The mean hepatic relative storage capacity for TC and TCDC was 0.16 ± 0.07 and 0.09 ± 0.03 (μM/kg body weight), resp. The mean secretory transport maximum (in μM/min/kg body weight) of TC was 4.84 ± 1.24 when calculated and 4.50 ± 0.81 when measured, and of TCDC was 3.56 ± 0.06 by calculation and 3.29 ± 0.09 by measurement. The value of the secretory transport maximum was slightly higher and of the relative storage capacity was lower with the multiple infusion method as compared to direct measurement of biliary secretion. The biliary secretion of bile acids achieved a maximal rate 20 min after the start of infusion and was independent of the serum bile acid concentration. The procedure is not applicable to man because of potential toxicity due to the high concentration (220-1,000 μM) of serum bile acid used.

5421 TAUROLITHOCHOLATE-INDUCED CHOLESTASIS: TAUROCHOLATE, BUT NOT DEHYDROCHOLATE, REVERSES CHOLESTASIS AND BILE CANALICULAR MEMBRANE INJURY. (Eng.) Layden, T. J.; Boyer, J. L. (Veterans Admin. West Side Hosp., Abraham Lincoln Sch. Medicine, 820 S. Damen Ave., Chicago, IL 60612). *Gastroenterology* 73(1):120-128; 1977.

The effect of simultaneous equimolar infusions of either dehydrocholate (DHC) or taurocholate on taurolithocholate (TLC)-induced changes in bile secretion and bile canalicular membrane morphology was studied in male Sprague-Dawley rats to determine whether TC prevents TLC-induced cholestasis through its choleretic action or by its micelle-forming properties. When TC (0.8 μmol/min) was simultaneously infused for 1 hr with TLC (0.6 μmol/min), bile flow increased by 45%, in contrast to combined DHC (0.8 μmol/min) and TLC infusions where bile flow was observed to decline by 20%. When TLC was infused alone, bile flow declined by 65%, and a parallel reduction in ^{14}C-erythritol clearance was also observed although ^{3}H-inulin clearance remained unchanged. This maintenance of the clearance of ^{3}H-inulin corresponded with a threefold rise in bile to plasma ^{3}H-inulin ratios from the preinfusion ratio of 0.079 ± 0.005 to 0.241 ± 0.050, 50 min after infusion of TLC. Using equations previously described to relate inert solute clearance to bile flow, the rise in bile to plasma ^{3}H-inulin ratios and the maintenance of ^{3}H-inulin clearance was best explained by an increase in diffusion permeability of the biliary tract. Simultaneous infusions of TC prevented TLC-induced changes in inulin permeability to a greater extent than simultaneous infusions of DHC. TC also reversed the injurious effect of TLC on the scanning electron microscopic appearance of the bile canalicular membrane, whereas DHC only partially prevented these changes. These results suggest that TLC induces cholestasis in part by increasing biliary membrane permeability to bile, and that TC may prevent TLC cholestasis and canalicular membrane injury primarily by its capacity to solubilize TLC in mixed micelles.

5422 FACILITATION OF HEPATIC UPTAKE OF PHENOL 3,6-DIBROMPHTHALEIN DISULFONATE BY TAUROCHOLATE. (Eng.) Marinovic, Y.; Glasinovic, J. C.; Semelle, B.; Boivieux, J. F.; Erlinger, S. (Hopital Beaujon, 92110 Clichy, France). *Am. J. Physiol.* 232(6):E560-E564; 1977.

The influence of sodium taurocholate (TC) on the hepatic uptake of phenol 3,6-dibromphthalein disulfonate (dibromosulphophthalein, DBSP) was examined in dogs. Single injections of DBSP (7.5-83.3 mg/kg) were given i.v., and the initial velocity of uptake (V) of the dye was calculated from the plasma disappearance rate measured during the first 5 min. The initial velocity of uptake of DBSP increased with the dose (D) in a nonlinear way, a finding consistent with Michaelis-Menten kinetics. The maximal initial velocity of uptake (V_{max}) was 7.5 ± 1.0 mg/min/kg, and the half-saturation constant (K_d) was 27.7 ± 7.0 mg/kg. When a TC infusion was given prior to the DBSP injection, the initial disappearance of the dye was more rapid than in the absence of the bile acid; V_{max} increased to 12.3 ± 2.0 mg/min/kg ($p<0.001$) and K_d increased to 50.3 ± 12.8 mg/kg ($p<0.001$). These results indicat that the uptake of DBSP by the liver cell is a saturable process and that TC increases both the V_{max}, suggesting a facilitation of the uptake process, and the K_d, suggesting competition for a common site. This effect of TC on DBSP uptake is similar to the previously described effect of this bile salt on BSP excretion into bile and suggests interaction of bile salts with the uptake process of dyes.

5423 INFLUENCE OF HEPATIC TAURINE CONCENTRATION ON BILE ACID CONJUGATION WITH TAURINE. (Eng.) Hardison, W. G. M.; Proffitt, J. H. (Veterans Admin. Hosp., San Diego, CA 92161). *Am. J. Physiol.* 232(1):E75-E79; 1977.

The relationship between hepatic taurine concentration and the proportion of infused sodium cholate conjugated with taurine was studied in the perfuse rat liver. The isolated perfused liver was studie to eliminate possible transfer of taurine to or from the large extrahepatic pools present *in vivo*. During cholate infusion, the proportion of taurocholate excreted in bile decreased, and the proportion of glycocholate increased in a complementary fashion. Infusion of taurine with cholate prevente these changes. Hepatic taurine concentration, calculated from measured hepatic taurine concentratio before and at the end of cholate infusion, fell. Fall in proportion of total bile acid excreted as taurocholate was most rapid at low hepatic taurine concentrations between 1.4 and 0.65 μmol/g liver. Hepatic taurine concentration is a major determinant of the proportion of bile acid conjugated with taurine.

5424 HEPATIC UPTAKE AND BILIARY EXCRETION OF A BILE SALT ANALOG: GLYCODIHYDROFUSIDATE.

(Eng.) Montet, J. C.; Gerolami, A.; Durbec, J. P.; Crotte, C.; Montet, A. M.; Hauton, J. C. (Groupe de Recherches INSERM sur le Transport des Lipides [U 130] et Unite de Pathologie Digestive [U 31], 13009 Marseille, France). *Biomedicine* 26(1):60-64; 1977.

Hepatic uptake and biliary excretion of glyco-24,25-ihydrofusidate (GDHF) were studied in male Wistar rats. Two groups of six rats were perfused in the femoral vein, with one group receiving 0.15 M sodium chloride and the other group receiving 10 μmol/min/kg sodium dehydrocholate; 30 min after the onset of perfusion, all rats received a single i.v. injection of 3 μmol GDHF (1 μCi). The fractional transfer rate (blood towards liver) of GDHF was significantly ($2p<0.05$) higher in control rats (sodium chloride treated) than in dehydrocholate-treated rats, with the values being 1.091 ± 0.030/min versus 0.585 ± 0.056/min, resp. The fractional transfer rates for liver towards blood transport were not significantly different for control versus dehydrocholate-treated rats, being 0.059 ± 0.006/min and 0.053 ± 0.003/min, resp. The fractional transfer rate of GDHF from the liver to the bile was 0.083 0.007/min for control rats, but was significantly reduced ($2p<0.05$) in dehydrocholate-treated rats 0.030 ± 0.003/min). It is suggested that the uptake and biliary excretion of GDHF involves, at least partially, the transport mechanisms employed for bile salts.

5425 FETAL BILE SALT METABOLISM: THE INTESTINAL ABSORPTION OF BILE SALT.

(Eng.) Lester, R.; Smallwood, R. A.; Little, J. M.; Brown, A. S.; Piasecki, G. J.; Jackson, B. T. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Clin. Invest.* 59(6):1009-1016; 1977.

The intestinal absorption of sodium taurocholate was studied in near-term fetal and neonatal dogs. Absorption rates were measured *in vivo* in isolated loops of fetal jejunum and ileum. Absorption was also measured *in vitro* in everted sacs and rings of fetal and neonatal jejunum and ileum. The maximal rates of taurocholate absorption, after instillation of 1 μmol taurocholate into closed segments of fetal jejunum and ileum with intact blood supply, were similar (0.282 ± 0.026 and 0.347 ± 0.051 μmol/hr/10-cm segment length jejunum and ileum, resp.). The rates of absorption from open segments of jejunum and ileum perfused with 0.4 and 1.0 mM taurocholate were also similar, 0.232 ± 0.040 and 0.255 0.039 μmol/hr, resp. at 0.4 mM, and 0.470 ± 0.065 and 0.431 ± 0.013 μmol/hr, resp., at 1.0 mM. At perfusate concentrations of 4.0 mM, moreover, jejunal absorption exceeded ileal absorption (1.490 0.140 and 0.922 ± 0.200 μmol/hr, resp. ($p<0.05$). The mucosal taurocholate concentration was readily demonstrated in adult ileal, but not in adult jejunal, everted rings. In contrast, there were no significant differences in mucosal uptake of taurocholate by fetal jejunal and ileal rings. Fetal ileal mucosal concentrations were not significantly above those in the incubation medium after 1-hr exposure of the mucosa to 0.003, 0.03, and 0.3 mM taurocholate. Uptake was proportional to the incubation medium concentration over the full range of values. This was also true of tissues from 1-week-old neonates. However, by 2 weeks of age, ileal mucosal concentration of taurocholate was evident, and adult levels were attained by 5 weeks of age. It is concluded that taurocholate is absorbed by the fetal gut and that ileal absorption is no more efficient than jejunal absorption. Although active glucose transport was demonstrable in both jejunum and ileum, it was not possible to demonstrate an ileal mechanism for active transport of taurocholate in the fetus. Active ileal transport was not demonstrable in the newborn until at least 2 weeks after birth.

5426 RADIOIMMUNOASSAY OF BILE ACIDS: DEVELOPMENT, VALIDATION, AND PRELIMINARY APPLICATION OF AN ASSAY FOR CONJUGATES OF CHENODEOXYCHOLIC ACID.

(Eng.) Schalm, S. W.; van Berge-Henegouwen, G. P.; Hofmann, A. F.; Cowen, A. E.; Turcotte, J. (Univ. Hosp., Dijkzigt, Rotterdam, Netherlands). *Gastroenterology* 73(2):285-290; 1977.

A rapid, sensitive, precise radioimmunoassay for conjugates of chenodeoxycholic (chenic) acid was developed and validated. Immunogen was prepared with chenylglycine coupled to bovine serum albumin, emulsified in Freund's complete adjuvant, and injected intracutaneously in rabbits. Antibodies of moderate titer (used at 1:7,500 final dilution) were obtained. Tracer of high specific activity was prepared by reductive tritiation of Δ^{11}-chenylglycine. The binding step required 1 hr at room temperature; separation of bound tracer was achieved by addition of ammonium sulfate. The limit of sensitivity of the assay was about 20 nM, and the lower limit of the working range was 0.4 μM. The assay was validated by measuring levels in samples of fasting state serum to which known amounts of chenylglycine had been added; the assay was also validated by means of gas-liquid chromatography on sera from jaundiced patients. The median fasting state serum level in 56 patients was 0.9 μM (upper limit of normal being 2.3), which is in the same range as that reported by others using gas-liquid chromatography. A 5- to 10-fold increase in levels of chenyl conjugates was observed 1 hr after the ingestion of a liquid meal in healthy persons. These results indicate that a satisfactory radioimmunoassay for conjugates of chenic acid has been developed.

5427 RELATIONSHIP BETWEEN BILE FLOW AND Na$^+$, K$^+$-ADENOSINETRIPHOSPHATASE IN LIVER PLASMA MEMBRANES ENRICHED IN BILE CANALICULI.

(Eng.) Reichen, J.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *J. Clin. Invest.* 60(2):429-434; 1977.

The relation between bile flow and Na^+, K^+-ATPase activity in liver plasma membranes enriched in bile canaliculi was studied in rats treated with ethinyl estradiol (5 mg/kg/day, s.c., 5 days), phenobarbital (80 mg/kg/day, i.p., 4 days), or 20-methyl cholanthrene (20 mg/kg/day, i.p.). Bile flow in controls (1.49 ± 0.12 μl/min/g liver) was significantly higher than that in animals treated with estradiol (0.92 ± 0.31 μl/min/g), significantly lower than that in animals treated with phenobarbital (2.50 ± 0.21 μl/min/g), and similar to that in animals treated with 20-methyl cholanthrene or the solvent propanediol (1.62 ± 0.18 and 1.64 ± 0.30 μl/min/g, resp.). The corresponding values for canalicular Na^+, K^+-ATPase activity were 80.7 ± 19.2, 50.0 ± 18.4, 231.7 ± 42.6, 82.7 ± 30.7, and 143.6 ± 55.3 μmol inorganic phosphate/hr/g liver, resp. Canalicular Na^+, K^+-ATPase activity was significantly correlated ($r=0.785$, $n=31$) with bile flow. These findings support the hypothesis that a fraction of bile flow is related to Na^+, K^+-ATPase activity and canalicular Na^+ transport.

5428 PURIFICATION AND CHARACTERIZATION OF HUMAN LIVER-SPECIFIC MEMBRANE LIPOPROTEIN (LSP).

(Eng.) McFarlane, I. G.; Wojcicka, B. M.; Zucker, G. M.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., London SE5 8RX, England). *Clin. Exp. Immunol.* 27(3):381-390; 1977.

The purification and characterization of human liver-specific membrane lipoprotein (LSP), present in 105,000 x *g* supernatants of human liver, are reported. LSP is present in homogenates of human kidneys, spleen, adrenal, thyroid, or submaxillary gland extracts. LSP cross-reacts immunologically with antigen(s) on the surface of isolated rabbit hepatocytes. Although very labile, LSP was prepared in a stable form by gel filtration on Sepharose 6B in a Tris buffer containing 1 mM disodium EDTA. LSP was also stable in a borate buffer containing EDTA, but was unstable in a number of other buffer systems. When prepared by the above method, LSP contained approximately 2% albumin as the only detectable contaminant. Gel filtration studies on the apoprotein of LSP revealed that it has an apparent molecular weight between 4 and 20 x 10^6. Sodium dodecylsulfate polyacrylamide gel electrophoresis indicated that the lipoprotein may be composed of up to 13 subunits of different molecular sizes. The purification of LSP in stable form will facilitate further investigation of its suggested role in the pathogenesis of chronic active hepatitis. In particular, it may now be possible to develop a sensitive technique for the detection of antibodies to this antigen. This may provide a valuable tool in the diagnosis of chronic active hepatitis and for the monitoring of the effects of therapy in patients with this disease, since recent evidence suggests that a humoral response to LSP may be of central importance in the continuing hepatocellular necrosis.

5429 EFFECT OF COLCHICINE, CYCLOHEXIMIDE AND CHLOROQUINE ON THE HEPATIC TRIACYLGLYCERO HYDROLASE IN THE INTACT RAT AND PERFUSED LIVER.

(Eng.) Chajek, T.; Friedman, G.; Stein, O.; Stein, Y. (Hadassah Univ. Hosp., Jerusalem, Israel). *Biochim. Biophys. Acta* 488(2):270-279; 1977.

Hepatic triacylglycerol hydrolase activity was studied in the intact rat and in isolated perfused rat liver. Using cycloheximide (0.5 mg/100 g, i.p.) to inhibit protein synthesis in intact rats, the half life ($T_{1/2}$) of total enzyme activity in the liver was 4.6 hr. Using nonrecirculating perfusion, the heparin-releasable fraction of liver triacylglycero hydrolase was shown to comprise about 30% of the total activity; maximal rates of release were obtained within 2 min of perfusion. Following pretreatment with colchicine (0.5 mg/100 g, i.p.), th fraction was reduced to only 13%, while total enzym activity remained the same as in controls. Contra to these findings, the fall in total enzyme activi 3 hr after cycloheximide was accounted for mainly by a fall in residual activity, while the heparin-releasable activity fell only between 3 and 6 hr after inhibition of protein synthesis. These findings indicate that this triacylglycerol hydrolase is synthesized in the liver and is delivered to the cell surface through a vesicular transport system and that this transport apparently continues t operate 3 hr after inhibition of protein synthesis The fact that pretreatment of intact rats with chloroquine (7.5 mg/100 g followed by 5 mg/100 g every 2 hr) increased enzyme activity 26% suggests that lysosomal enzymes may participate in the degradation of the enzyme. The enzyme may reside near a lipoprotein remnant receptor, and it may be interiorized during remnant endocytosis.

5430 EFFECT OF ACUTE MURINE HEPATITIS (MHV-A 59) ON ETHANOL OXIDATION IN VIVO. (Eng

Carter, E. A.; Wands, J. R.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 73(2):321-326; 1977.

The effect of mild, moderate, and severe hepatitis infection induced by murine hepatitis A-59 virus on ethanol metabolism was investigated *in vivo*. Female outbred Charles River mice were injected i. with 8, 12, and 16 complement fixation units of virus, which produced liver damage ranging from mild (3-4 foci of necrosis and inflammation per hepatic lobule) to severe hepatitis (destruction o 70%-90% of hepatocytes). Ethanol oxidation was measured 48 hr after infection, when maximal cell damage was present as determined by light microsco and SGOT values. Ethanol (2.4 g/kg) was injected i.p., and the rate of ethanol oxidation was measu by cumulative production of $^{14}CO_2$ from ^{14}C-ethanol sequential serum ethanol levels; and ethanol clea ance using a s.c. air bubble technique. Using these methods there was no difference in ethanol oxidation between infected and control animals ($p<0.2$). 4-Methylpyrazole (100 mg/kg) produced a 80% reduction in cumulative $^{14}CO_2$ production, prevented a progressive decline in blood ethanol leve and abolished the ethanol clearance in control mi over a 3-hr period. A marked depression of *in vivo* oxidation of ^{14}C-aminopyrine oxidation to $^{14}CO_2$ was observed in animals with severe hepatitis ($p<0.001$). Mild, moderate, and severe murine hepatitis appears to have no effect on ethanol oxidation *in vivo*, but does exert a marked inhibitory effect on microsomal enzyme function.

5431 EFFECT OF RIBAVIRIN ON VIRAL HEPATITIS IN LABORATORY ANIMALS.

(Eng.) Sidwell, R. W.; Huffman, J. H.; Campbell, N.; Allen, L. B. (ICN Pharmaceuticals, Inc., Irvine, CA 92715). *Ann. N.Y. Acad. Sci.* 284:239-246; 1977.

The effect of 1-β-D-ribofuranosyl-1,2,4-triazole-3-carboxamide (ribavirin) on male Swiss Webster mice and female Syrian golden hamsters inoculated i.p. with about 10 times the LD$_{50}$ of murine hepatitis virus (MHV, Friend-Braunsteiner strain) and equine abortion virus (EAV), resp., was investigated. The drug was administered i.p. twice daily, beginning 1 hr before virus inoculation and continuing for 4 days in the case of EAV-infected hamsters or beginning 2 hr before virus inoculation and continuing for 9 days in the case of MHV-infected mice. At a dose of 200 mg/kg/day, ribavirin caused a 2.2-day increase in the mean survival time of EAV-infected hamsters ($p<0.05$), and 20% of the treated hamsters survived infection as compared with a 0% survival for controls. Ribavirin at a dose of 100 mg/kg/day was not effective; it was lethally toxic at doses of 300 and 400 mg/kg/day. In MHV-infected mice, ribavirin at doses of 4.7-75 mg/kg/day was effective in increasing the mean survival from control values of 4.4 and 4.8 days to values as high as 7.2 and 21.0+ days in two sets of experiments ($p<0.05$ in all cases). At doses of 18.8 mg/kg/day and greater, ribavirin also significantly increased the number of survivors ($p<0.001$ at this dose). Ribavirin treatment delayed the increase in SGOT levels seen in virus-infected mice, although by day 5, a moderate increase from a preinjection value of about 50 S-F U/ml to about 225 S-F U/ml was seen. Ribavirin treatment in both infected and uninfected mice caused an initial, moderate rise in bilirubin on day 1 from a preinoculation value of about 0.75 mg% to over 1.0 mg%; this rise then declined by day 3 to less than 1.0 mg% and then rose in virus-infected, ribavirin-treated mice on day 5 to about 1.4 mg%. Marked damage was plainly visible in the livers of virus-infected control animals, but was notably less apparent in ribavirin-treated animals. The results indicate that ribavirin has a marked effect on hepatitis in MHV-infected mice and a marginal effect on hepatitis in EAV-infected hamsters.

5432 BILIARY EXCRETION OF IOPANOATE GLUCURONIDE BY THE RAT.

(Eng.) Cooke, W. J.; Cooke, L. (Univ. Massachusetts Medical Sch., 55 Lake Ave. North, Worcester, MA 01605). *Drug Metab. Dispos.* 5(4):368-376; 1977.

Biliary excretion, plasma decay, and tissue distribution of ^{125}I after a single i.v. dose (13 μmol/kg) of ^{125}I-iopanoate and ^{125}I-iopanoate glucuronide were compared in control and phenobarbital-pretreated rats under ether anesthesia. In control animals, the plasma decay of iopanoate glucuronide following iopanoate glucuronide administration was significantly greater than that after iopanoate administration ($T_{½}=26.3 \pm 2.4$ min versus 58.2 ± 3.2 min, $p<0.05$). Biliary clearance following iopanoate glucuronide was approximately 20 times greater than that after iopanoate; within 60 min, 82% of the dose of iopanoate glucuronide, compared to 23% of the dose of iopanoate, was recovered in bile. Phenobarbital (40 mg/kg/day, x 3) pretreatment significantly increased the biliary excretion following iopanoate administration (36.3 ± 3.1% of dose excreted/60 min versus 26.1 ± 1.0%, $p<0.05$), but had no effect on that following iopanoate glucuronide. The urinary excretion after both agents was less than 3% of the administered dose within the 60-min experimental period. The data suggest that intracellular metabolism and/or binding may account for the marked difference in the biliary excretion of iopanoate glucuronide following iopanoate as compared to that after administration of iopanoate glucuronide.

5433 EFFECT OF BILE DUCT OBSTRUCTION ON PANCREATIC ENZYME SECRETION AND INTESTINAL PROTEOLYTIC ENZYME ACTIVITY IN THE RAT.

(Eng.) Green, G.; Nasset, E. S. (Children's Hosp. Medical Center, 51st and Grove St., Oakland, CA 94609). *Am. J. Dig. Dis.* 22(5):437-444; 1977.

The role of bile in the regulation of intestinal proteolytic activity in male HLA-W Wistar rat descendants was investigated by studying the effects of bile diversion and bile duct obstruction on pancreatic protease secretion and on recovery of protease from the small intestine. Diversion of bile and pancreatic juice from the intestine caused a large increase in pancreatic enzyme secretion, which reached a maximum value of about 55 x 10^3 benzoyl-1-tyrosine ethyl ester (BTEE) U/hr for chymotrypsin at 3 hr after diversion; replacement of bile partially suppressed this response. Bile duct obstruction resulted in a threefold increase in pancreatic juice chymotrypsin at 3-4 days post-obstruction, but caused a marked decrease in intestinal trypsin (378 ± 45 to 156 ± 19 x 10^3 tosyl-1-arginine methyl ester-TAME-U/rat, $p<0.01$), chymotrypsin (624 ± 89 to 101 ± 20 x 10^3 BTEE U/rat, $p<0.005$), and total proteolytic activities (742 ± 78 to 442 ± 63 U/rat, $p<0.025$). The percentage of recovery from the intestines of bile duct obstructed rats was lower for trypsin (34.2 ± 4.7, $p<0.05$), chymotrypsin (8.3 ± 2.7, $p<0.005$), and pancreatic juice protein (26.2 ± 3.5, $p<0.025$) than for control values (41.9 ± 3.0, 39.2 ± 3.8, and 39.0 ± 1.3, resp.). Bile duct obstruction did not influence the efficiency of washing in recovering intestinal trypsin activity, but decreased the efficiency of washing in recovering chymotrypsin activity from a control value of 78% to 61%. The results suggest that interruption of bile flow results in an accelerated rate of degradation of pancreatic proteolytic enzymes and that the increase in pancreatic enzyme secretion is an adaptation to decreased intestinal proteolytic activity.

5434 HEPATOCELLULAR TRANSPLANTATION IN ACUTE LIVER FAILURE. (Eng.) Sutherland, D. E. R.; Numata, M.; Matas, A. J.; Simmons, R. L.; Najarian, J. S. (Mayo Memorial Bldg., Univ. Minnesota Hosp., Minneapolis, MN 55455). *Surgery* 82(1):124-132; 1977.

The ability of dispersed hepatocytes to provide metabolic support when transplanted to rats with dimethylnitrosamine (DMNA)-induced liver damage was studied. DMNA (20 mg/kg) was administered to 92 Lewis rats. Animals were divided into four groups receiving the following treatments 24 hr after DMNA administration: group I, i.p. transplantation of hepatocytes prepared from 2.0 g of normal isologous rat liver; group II, infusion into the portal vein of hepatocytes prepared from 1.5 g of liver; group III, infusion of saline into the portal vein; and group IV, no further treatment. The percentages surviving in each group 3 weeks after DMNA administration were 63%, 71%, 17%, and 6%, resp. Mean SGOT levels 3 days after DMNA administration were similar in the four groups, indicating that the degree of liver damage was equivalent. A significantly higher proportion of hepatocyte-treated rats survived. Rats in group III had the highest initial mortality and a long-term survival of only 17%. The long-term survival (>60 days) rates in groups I, II, and IV were 63%, 71%, and 6%, resp. Liver histology after DMNA administration showed hemorrhagic central lobular necrosis. A return to near-normal architecture occurred by 3 weeks in surviving animals. In group II, hepatocytes were seen in portal venules, sinusoids, and central veins. Dispersed hepatocytes, transplanted either i.p. or via the portal vein, can provide sufficient metabolic support to allow for recovery from drug-induced hepatic necrosis.

5435 TWO ALDEHYDE DEHYDROGENASES FROM HUMAN LIVER: ISOLATION VIA AFFINITY CHROMATOGRAPHY AND CHARACTERIZATION OF THE ISOZYMES. (Eng Greenfield, N. J.; Pietruszko, R. (Center Alcohol Studies, Rutgers Univ., New Brunswick, NJ 08903). *Biochim. Biophys. Acta* 483(1):35-45; 1977.

5436 A LIPOGENIC EFFECT IN INTACT MALE HAMSTE INFECTED WITH PLEROCERCOIDS OF THE TAPEWORM, Spirometra mansonoides. (Eng.) Phares, C. Carroll, R. M. (Univ. Nebraska Medical Center, Omaha, NB 68105). *J. Parasitol.* 63(4):690-693; 1977.

5437 HYPOCHOLESTEREMIC EFFECT OF MICROSOMAL ENZYMES INDUCTION IN RAT LIVER. (Rus.) Salganik, R. I.; Manankova, N. M.; Semenova, L. A. (Inst. Cytology and Genetics, Novosibirsk, USSR). *Vopr. Med. Khim.* 23(4):468-473; 1977.

5438 STUDY OF NEURAMINIDASE AND SIALYL TRANSFERASE IN REGENERATING RAT LIVER. (Rus. Gabrielyan, N. D.; Valyakina, T. I.; Komaleva, R. L.; Lapina, E. B.; Khorlin, A. Yu. (M. M. Shemyaki Inst. Biological Chemistry, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (3):50-54; 1977.

See also, 5264, 5443, 5484, 5487, 5497, 5499, 5500
5522, 5663, 5670, 5673, 5797, 5825, 5848
5869, 5919, 5928, 5930.

SECRETION AND METABOLISM

Intestine

5439 ELECTRON MICROSCOPIC STUDIES OF THE ASSEMBLY, INTRACELLULAR TRANSPORT, AND SECRETION OF CHYLOMICRONS BY RAT INTESTINE. (Eng.) Sabesin, S. M.; Frase, S. (Dept. Tennessee Center for the Health Sciences, Memphis, TN 38163). *J. Lipid Res.* 18(4):496-511; 1977.

The assembly, intracellular transport, and secretion of chylomicrons were investigated ultrastructurally in the proximal jejunal cells of male Sprague-Dawley rats fed 1.5 ml of corn oil. Following fat feeding, the smooth endoplasmic reticulum of the absorptive cells became laden with triglyceride droplets that were transported through channels of the endoplasmic reticulum to the Golgi apparatus. The Golgi zones became extremely prominent due to the accumulation of osmiophilic droplets, similar in size and configuration to chylomicrons, within proliferated Golgi vesicles. Golgi-derived secretory vesicles, containing nascent chylomicrons, migrated towards the lateral cell membrane. The secretory vesicle membranes fused with the lateral plasmalemma, and nascent chylomicrons were then seen to be discharged into the intercellular spaces. Alteratio of specific domains of the secretory vesicles wer prominent, appearing as coated pits. Coated pits were apparent in the lateral plasmalemma in areas of active chylomicron exocytosis, suggesting thei derivation from secretory vesicle-membrane fusion Chylomicrons, within the intercellular spaces, passed through the basement membrane that lines t basal surfaces of the epithelial cells, traversed the cellular elements of the lamina propria, and finally gained access to the lymphatics entering these channels through gaps between adjacent endothelial cells. These observations indicate that nascent chylomicrons accumulate within Golgi vesicles as a prerequisite to secretion and that secr tion occurs by exocytosis, resulting in the relea of nascent chylomicrons from secretory vesicles.

5440 MORPHOLOGY AND ENZYME ACTIVITY IN RAT SMALL INTESTINAL EPITHELIUM 6 AND 12 HRS. AFTER AN ALKYLATING AGENT (CYCLOPHOSPHAMIDE). (Eng.)

Ecknauer, R. (Dept. Clinical Chemistry, Univ. Ulm, Steinhovelstr. 9, D-7900 Ulm, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):365-371; 1976.

Morphologic and enzymatic changes in the small intestinal epithelium of specified pathogen-free (SPF) and germfree (GF) Wistar rats were investigated 6 and 12 hr after the administration of a single i.p. dose of cyclophosphamide (100 mg/kg). In GF rats, there were no significant changes in the activity of the brush border enzymes maltase, sucrase, lactase, alkaline phosphatase, and γ-glutamyltransferase. In SPF rats, the only significant difference ($p<0.05$) in brush border enzyme activities was between the maltase activities; this difference was only significant when expressed per cm of gut length. There were no significant changes in acid phosphatase activity after drug treatment in either GF or SPF rats. Morphologically, the pattern of response to cyclophosphamide appeared to be different in SPF and GF rats. Villus height was not significantly changed in SPF rats, but GF rats showed a small reduction in villus height at 12 hr after drug treatment (589 µm versus a pretreatment height of 647 µm, $0.025<2p<0.05$). In SPF rats, the number of epithelial cells per crypt section was reduced at 12 hr (48 ± 3) in comparison with that at 6 hr (55 ± 2, $2p<0.01$). A reduction in mitotic figures per crypt 6 hr after cyclophosphamide treatment (1.4 ± 0.4) in comparison with pretreatment levels (2.1 ± 0.4) was significant only in SPF rats ($0.01<2p<0.02$). Intestinal function, as measured by galactose absorption *in vivo*, was not affected by cyclophosphamide treatment in either GF or SPF rats, whether expressed in terms of gut length, wet weight of mucosa, or gram mucosal protein.

5441 ACTIVE CHLORIDE SECRETION BY RABBIT COLON: CALCIUM-DEPENDENT STIMULATION BY IONOPHORE A23187. (Eng.)

Frizzell, R. A. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *J. Membrane Biol.* 35(2):175-187; 1977.

The possible involvement of calcium as an intracellular messenger was investigated using the Ca ionophore A23187. Addition of the ionophore to the solution bathing the mucosal surface of descending rabbit colon resulted in a reversal of active Cl absorption to active Cl secretion, a twofold increase in short-circuit current, and a 40% increase in tissue conductance, without affecting the rate of active Na absorption. These alterations in electrolyte transport are quantitatively similar to those previously observed in response to cyclic 3',5'-AMP (cAMP). When medium Ca concentration was reduced to 10^{-6} M, the secretory response to A23187 was abolished, but the response to cAMP was unaffected. The ionophore did not influence the cAMP levels of colonic mucosa. Addition of cAMP to colonic strips preloaded with ^{45}Ca elicited a reversible increase in Ca efflux from the tissue. These results suggest that an increase in intracellular Ca concentration stimulates colonic electrolyte secretion and that the secretory response to cAMP may be due, at least in part, to a release of Ca from intercellular stores.

5442 NONPARALLEL SECRETION OF ENZYMES IN HUMAN DUODENAL JUICE AND PURE PANCREATIC JUICE COLLECTED BY ENDOSCOPIC RETROGRADE CATHETERIZATION OF THE PAPILLA. (Eng.)

Dagorn, J. C.; Sahel, J.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM U 31-46 chemin de la Gaye, 13009 Marseille, France). *Gastroenterology* 73(1):42-45; 1977.

Enzyme secretion was studied in human duodenal and pancreatic juice following the administration of cholecystokinin-pancreozymin (CCK-PZ) and secretin, to determine whether different enzymes respond in parallel to hormone stimulation. Duodenal juice was collected at 15-min periods from 50 subjects free of pancreatic disease in the basal state and after the i.v. injection of CCK-PZ (3 Crick-Harper-Raper U/kg) plus secretin (1 clinical U/kg). The mean amylase to chymotrypsin ratios were decreased from a basal level of 0.081 to 0.039, 0.046, and 0.051 in the first, second, and third periods, resp. ($p<0.01$, $p<0.01$, and $p<0.05$, resp.), and the amylase to lipase ratios were decreased from a basal level of 0.925 to 0.41, 0.44, and 0.52 in the respective periods ($p<0.01$ in all cases). Pure pancreatic juice was collected from seven subjects by endoscopic retrograde catheterization of the papilla. Secretin (1 clinical U/kg/hr) was infused i.v. during 30 min, and a single i.v. injection of CCK-PZ (3 Crick-Harper-Raper U/kg) was administered at the 15th min of the secretin infusion. The chymotrypsinogen and lipase secretions did not parallel that of amylase during CCK-PZ stimulation. As in the first set of experiments, amylase secretion was proportionally less stimulated by CCK-PZ injection than were chymotrypsinogen and lipase secretions. In five of six cases, CCK-PZ stimulation induced a significant ($p<0.01$) 30-50% decrease in the amylase to chymotrypsin ratio. However, in approximately 20% of subjects, the secretion of the enzymes was parallel in both duodenal and pancreatic juice. The results on pure pancreatic juice support the finding of a nonparallel secretion of enzymes in duodenal juice.

5443 STIMULATION OF MUCOSAL GROWTH IN THE RAT ILEUM BY BILE AND PANCREATIC SECRETIONS AFTER JEJUNAL RESECTION. (Eng.)

Weser, E.; Heller, R.; Tawil, T. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX 78284). *Gastroenterology* 73(3):524-529; 1977.

The role of bile and pancreatic secretions in stimulating ileal mucosal growth after jejunectomy was studied in male Sprague-Dawley rats. The animals were fed either standard rat chow or a liquid elemental diet, and were divided into four surgical groups: sham-operated, transplantation of the duodenal papilla (containing the bile and pancreatic ducts) into the ileum, 50% proximal small bowel resection (jejunectomy), and combined transplantation of the duodenal papilla into the ileum and 50% proximal small bowel resection. Four weeks after surgery, total ileal weight and mucosal weight, and DNA and protein concentration per cm of segment, were significantly increased in ileal segments adjacent to the transplanted duodenal papilla both in nonresected and jejunectomized rats, compared with their respective controls. Transplanting the duodenal papilla into the ileum significantly increased growth of the ileal mucosa after jejunectomy. The results indicate that bile and pancreatic secretions flowing into the ileal lumen stimulate mucosal growth and play a direct role in ileal adaptation to jejunal resection.

5444 THYROXINE-EVOKED DECREASE OF JEJUNAL LACTASE ACTIVITY IN ADULT RATS. (Eng.) Celano, P.; Jumawan, J.; Koldovsky, O. (Children's Hosp. of Philadelphia, Philadelphia, PA 19104). *Gastroenterology* 73(2):425-428; 1977.

Because of the known involvement of the thyroid in the expression of the normal developmental patterns of various intestinal functions, the effect of short-term hyperthyroidism on microvillar sucrase and lactase and on lysosomal acid-β-galactosidase was investigated in adult rat jejunum. The daily administration of L-thyroxine (200 μg/100 g, s.c.) decreased the total and specific lactase activity by 35%; this depression was maintained by daily injections of L-thyroxine at this dose for 3, 4, and 10 days. The injection of D-thyroxine (200 μg/100 g/day) for 4 days produced a similar decrease in lactase activity. Sucrase activity was not affected by L-thyroxine, except for a 30% increase after 10 days of treatment (200 μg/100 g/day). Sucrase activity was significantly decreased by D-thyroxine treatment. The activity of acid-β-galactosidase was unaffected by either D- or L-thyroxine. Subnormal lactase activity may be involved in the generation of diarrhea and steatorrhea in hyperthyroid patients.

5445 INHIBITION OF CHOLECYSTOKININ-PANCREOZYMIN RELEASE BY SOMATOSTATIN. (Eng.) Schlegel, W.; Harvey, R. F.; Raptis, S.; Oliver, J. M.; Pfeiffer, E. F. (Dept. Internal Medicine, Univ. Ulm, Steinhovelestrasse 9, 7900 Ulm, W. Germany). *Lancet* 2(8030):166-167; 1977.

To determine the effect of somatostatin on cholecystokinin-pancreozymin (CCK) release, serum CCK concentrations were measured in five normal volunteers after the intraduodenal administration of 40 ml of olive oil, with and without a simultaneous i.v. infusion of somatostatin (250 μg, followed by 250 μg/hr for 1 hr). After instillation of the olive oil, there was a rapid rise in serum CCK (integrated response 19,682 ± 5,632 pg/min/ml). This rise was completely abolished by somatostatin (integrated response -373 ± 330 pg/min/ml, $p<0.005$), and rebound hypersecretion was seen after the infusion had been stopped. These findings indicate that somatostatin may be involved in regulating CCK release after meals, and suggest a possible explanation for the profound steatorrhea seen in a patient with a somatostatin-producing tumor.

5446 EFFECT OF GLUCOSE AND DIURETICS ON INTRACELLULAR POTENTIALS OF MOUSE INTESTINAL MUCOSA. (Eng.) Dinno, M. A.; Huang, K. C. (Univ. Louisville Sch. Medicine, P.O. Box 1055, Louisville KY 40201). *Proc. Soc. Exp. Biol. Med.* 155(1):71-78; 1977.

5447 RADIOIMMUNOASSAY FOR A VITAMIN-D DEPENDEN
CALCIUM-BINDING PROTEIN IN RAT DUODENAL MUCOSA. (Eng.) Marche, P.; Pradelles, P.; Gros, C
Thomasset, M. (INSERM U-120, 44 Chemin de Ronde, 78110 Le Vesinet, France). *Biochem. Biophys. Res. Commun.* 76(4):1020-1026; 1977.

5448 EFFECT OF MATERNAL PROTEIN DEPRIVATION ON THE DEVELOPMENT OF NEONATAL INTESTINAL
FUNCTION IN RATS. (Eng.) Ferdinandus, L. D.; Fitz
gerald, J. F. (James Whitcomb Riley Hosp. for Chil
ren, Indianapolis, IN). *Pediatr. Res.* 11(7):804-8
1977.

5449 EFFECT OF MAILLARD REACTION PRODUCTS ON
SACCHARIDASE ACTIVITIES IN THE RAT. (En
Lee, C. M.; Chichester, C. O.; Lee, T. C. (Dept. N
trition and Foods, Drexel Univ., Philadelphia, PA)
J. Agric. Food Chem. 25(4):775-778; 1977.

5450 CENTRALLY MEDIATED INTESTINAL STIMULATIO
BY MORPHINE. (Eng.) Stewart, J. J.; Weisbrodt, N. W.; Burks, T. F. (Univ. Texas Medica
Sch. at Houston, P.O. Box 20708, Houston, TX 77030
J. Pharmacol. Exp. Ther. 202(1):174-181; 1977.

5451 CONTROL OF VITAMIN D-DEPENDENT CALCIUM-BINDING PROTEIN IN RAT INTESTINE BY GROW
AND FASTING. (Eng.) Bruns, M. E. H.; Fleisher, E
B.; Avioli, L. V. (Jewish Hosp. of St. Louis, St. Louis, MO 63110). *J. Biol. Chem.* 252(12):4145-415
1977.

5452 STUDIES ON INTESTINAL ADENOSINE TRIPHOSPHATASES. II. STABILITIES IN DIFFEREN
RAT SUBCELLULAR FRACTIONS. (Eng.) Sall, I.; Fer
G.; Metais, P. (UER des Sciences Pharmaceutiques, Universite Louis Pasteur, F-67083 Strasbourg, Fra
Enzyme 22(3):158-165; 1977.

5453 ENDOCRINE CONTROL OF THE INTESTINAL CAL
EXCRETION. (Eng.) Fujita, T.; Ohata,
Okano, K.; Yoshikawa, M. (Wakayama Medical Coll., Wakayama-shi 640, Japan). *Endocrinol. Jpn.* 24(1)
15-18; 1977.

5454 THE ROLE OF BRADYKININ IN ENDOTOXIC SHOCK OF INTESTINAL ORIGIN. (Eng.) Fink, R. L. W.; Mashford, M. L.; Caridis, D. T. (20 Collins St., Melbourne, Victoria 3000, Austra
ia). *Aust. N.Z. J. Surg.* 47(1):102-105; 1977.

455 THE EFFECTS OF AGE ON MUCOSAL MORPHOLOGY
AND EPITHELIAL CELL PRODUCTION IN RAT
MALL INTESTINE. (Eng.) Clarke, R. M. (Faculty
edicine, Univ. Newcastle, Newcastle 2308, New
outh Wales, Australia). *J. Anat.* 123(3):805-
11; 1977.

456 THEOPHYLLINE-INDUCED CHANGES IN ION
TRANSPORT AND CONDUCTANCE IN HUMAN SMALL
NTESTINAL MUCOSA. (Eng.) Corbett, C. L.;
saacs, P. E. T.; Hawker, P. C.; Turnberg, L. A.
Hope Hosp., Salford, England). *Nature* 267(5613):
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157 EXCLUSION OF PANCREATIC EXOCRINE SECRETION
FROM INTESTINE IN THE PIG: EXISTENCE OF A
GESTIVE COMPENSATION. (Eng.) Corring, T.;
urdon, D. (Laboratoire de Physiologie de la Nutri-
on, C.N.R.Z. 78350, Jouy-en-Josas, France). *J.*
tr. 107(7):1216-1221; 1977.

58 SPECIFIC CYTOSOL-BINDING PROTEIN FOR 1,25-
DIHYDROXYVITAMIN D_3 IN RAT INTESTINE.
ng.) Kream, B. E.; Yamada, S.; Schnoes, H. K.;
Luca, H. F. (Coll. Agricultural and Life Sciences,
iv. Wisconsin-Madison, Madison, WI 53706). *J.*
ol. Chem. 252(13):4501-4505; 1977.

59 STUDY OF THE SUBCELLULAR LOCALIZATION OF
^{59}Fe AND IRON-BINDING PROTEINS IN THE
ODENAL MUCOSA OF PREGNANT AND NONPREGNANT RATS.
ng.) Batey, R. G.; Gallagher, N. D. (Royal Free
sp., Pond St., Hampstead, London, NW3, England).
stroenterology 73(2):267-272; 1977.

5460 FINE-STRUCTURAL EFFECTS OF 1200-R ABDOMINAL X IRRADIATION ON RAT INTESTINAL EPITHELIUM. (Eng.) Lieb, R. J.; McDonald, T. F.; McKenney, J. R. (Medical Coll. Virginia, Richmond, VA 23298). *Radiat. Res.* 70(3):575-584; 1977.

5461 COENZYME-A-DEPENDENT ESTERIFICATION OF CHOLESTEROL IN INTESTINAL MUCOSA FROM GUINEA-PIG. INFLUENCE OF DIET ON THE ENZYME ACTIVITY. (Eng.) Norum, K. R.; Lilljeqvist, A. C.; Drevon, C. A. (Sch. Medicine, Univ. Oslo, P.O. Box 1046, Blindern, Oslo 3, Norway). *Scand. J. Gastroenterol.* 12(3):281-288; 1977.

5462 DETECTION OF A LONG ACTING ENDOGENOUS OPIOID IN BLOOD AND SMALL INTESTINE. (Eng.) Schulz, R.; Wuster, M.; Herz, A. (Max-Planck-Institut fur Psychiatrie, Kraepelinstrasse 2, 8000 Munchen 40, W. Germany). *Life Sci.* 21(1):105-116; 1977.

See also, 5270, 5281, 5287, 5289, 5292, 5293, 5294,
5305, 5333, 5356, 5367, 5381, 5466, 5467,
5469, 5470, 5471, 5472, 5473, 5482, 5490,
5503, 5685, 5700, 5717, 5938, 5945.

GENERAL

3 THE EFFECTS OF VARYING CONCENTRATIONS OF
DIETARY PROTEIN ON THE CEREBRAL GAMMA-
NO-BUTYRIC ACID OF RATS SUBMITTED TO PORTACAVAL
STOMOSIS. (Ita.) Vassanelli, P.; Norberto, L.;
chi, S.; Stella, G. D.; Settembrini, P. G. (Is-
uto di Patologia Speciale Chirurgia e Propedeu-
a Clinica, Universita di Padova, Padova, Italy).
a Chir. Ital. 31(2):295-300; 1975.

effect of protein content in the diet of animals
mitted to portacaval anastomosis was investigated.
ty male Sprague-Dawley rats were given a porta-
al shunt and divided into four equal groups. All
mals received a standard diet for 10 days. An
al number of sham-operated animals served as
trols. After 10 days, group A remained on a
ndard diet, group B received a diet of 9% protein,
up C, a diet of 34% protein, and group D a diet
0.5% protein. Animals on a standard diet had
4% increase in gamma-aminobutyric acid (GABA)
compared to controls. A diet of 34% protein resulted in a 50% increase in GABA. Animals fed 9% protein had GABA levels that were essentially the same as controls. The greatest increase in GABA content (180% over the controls) was seen in animals that received the protein-deficient diet (0.5%). These latter animals also had the most pronounced signs of encephalopathy and the highest mortality rate. It is suggested that there is a relation between cerebral GABA levels and encephalopathy.

5464 FINE STRUCTURAL CHANGES IN THE GASTRO-INTESTINAL TRACT OF THE HYPOXIC PUPPY: A STUDY OF NATURAL HISTORY. (Eng.) Harrison, M. W.; Connell, R. S.; Campbell, J. R.; Webb, M. C. (Univ. Oregon Health Sciences Center, 3181 S. W. Sam Jackson Park Rd., Portland, OR 97201). *J. Pediatr. Surg.* 12(3):403-408; 1977.

A study was undertaken to follow the structural changes in the gastrointestinal tract of the hypoxic puppy (Labrador puppies) in order to diagnose an early acute enterocolitis. Hypoxia was induced in eight puppies by increasing the flow of nitrogen until the oxygen concentration of the anesthetic gas mixture was 7%. Four control puppies were maintained in an atmosphere of 21% oxygen. Platelet and WBC aggregates, circulating lysosomal-like granules, and fibrin were present in the microcirculation of the lamina propria of the ileum and colon of puppies biopsied after 2 hr of sustained hypoxia. In the resuscitated puppy, biopsied 24 hr after the insult, these elements were not seen. However, perivascular edema and disruption of cellular elements in the lamina propria of the ileum and colon were still apparent in focal areas after 24 hr. Five days after the insult of hypoxia, the mucosa and underlying lamina propria appeared similar to those of the control puppies. It is suggested that an early focal and reversible stage of the development of acute enterocolitis could be described with the aid of electron microscopy. Death of the puppies could be predicted by the extent of microvascular and mucosal involvement.

5465 PATHOPHYSIOLOGY IN THE ACUTE AFFERENT LOOP SYNDROME. A STUDY IN RATS.

(Eng.) Bengtsson, S.; Dahlgren, S.; Hellsing, K. (Dept. Bacteriology, Univ. Uppsala, Uppsala, Sweden). *Acta Chir. Scand.* 142(6):461-466; 1976.

The acute afferent loop syndrome (occlusion of an afferent intestinal loop) following Billroth II partial gastrectomy was induced in rats to investigate the importance of osmosis during the development of the syndrome. Three groups of rats were used: controls (35 rats, rats in which the afferent loop syndrome was induced 2 months after gastroenterostomy and pyloric resection (GE, 98 rats), and rats used for complementary studies *in vitro* 4 months after GE (12 rats). The animals were killed at time intervals of 0.5, 1, 4, 8, or 12 hr after occlusion and hematocrit, serum osmolality, and the content and volume of the occluded loop were determined. In some cases, a sample of the content was incubated at 37 C, and the osmolality was determined at regular intervals. The hematocrit rose with time after the occlusion in the second group of rats (from an initial value of 31 ± 2.3 to a final value of 36 ± 2.3 12 hr after occlusion). However, the osmolality of the plasma and of the content of the occluded loop did not increase significantly. The volume of fluid in the occluded loop increased continuously with time from an average of 0.5 ml in the control group to 6.1 ml after 12 hr of occlusion. Experiments *in vitro* showed that the initial osmolality of the contents of the loop was 300 mOsm. After incubation of the samples, osmolality increased 43-146%. The bacterial content of the loop (including *Clostridium perfringens*) increased significantly. The results suggest that a marked breakdown of substances takes place in such an occluded intestinal loop, causing an increase in the osmolality. As a result, fluid is attracted to the loop to keep the osmolality constant. A combination of the fluid increase due to osmosis and contractions of the intestinal wall leads to an increased pressure in the occluded loop.

5466 BACTERIAL ASSOCIATION IN THE GASTROINTE TINAL TRACT OF BEAGLE DOGS.

(Eng.) Da C. P.; Cleven, D.; Balish, E.; Yale, C. E. (Univ. Texas Medical Branch, Galveston, TX 77550). *Appl Environ. Microbiol.* 34(2):194-206; 1977.

To determine whether the gastrointestinal tracts of adult dogs possess localized bacterial populaations and to ascertain whether different housing conditions alter the gastrointestinal flora, nine male beagle dogs, housed in either a conventional or locked environment for 2.5 yr, were killed, an the bacterial flora present in various regions of each gastrointestinal tract was assessed by cultu techniques, light microscopy, and scanning electr microscopy. All dogs possessed a complex colonic microflora; in almost every dog anaerobes predominated. The highest number of bacteria cultured was 10^{10}/g (dry weight) of tissue and contents; highest counts obtained with a Petroff-Hauser counting chamber were 10^{10}/ml (wet weight). Alth there was a consistency in the detectable genera there were also noticeable differences in the fl of dogs housed under different environmental con tions. These differences included qualitative a quantitative changes in the flora, as well as alterations in the distribution and localization of microorganisms along the gastrointestinal tra and in the crypts of Lieberkuhn. No bacterial l were detected on the surfaces of stomach or prox bowel in any of the dogs. Bacteria occurred in layers on the ceca and colons and in the crypts Lieberkuhn of dogs housed in a conventional, ope environment; however, dogs housed under "locked" environmental conditions did not possess or had layers of bacteria less frequently. Dogs remove from the locked environment and kept for 30 days in conventional housing conditions were the only ones with detectable segmented filamentous micro in their ilea. This study shows that the microb flora does not simplify when dogs are housed in locked environment. Indeed, it may increase in complexity and cause alterations in the bacteria flora that are associated closely with gastroint tinal epithelial cells and crypts of Lieberkuhn.

5467 INTESTINAL PROLIFERATION AFTER MULTIPL FRACTIONS OF GAMMA IRRADIATION.

(Eng Maisin, J.; Wambersie, A.; Lambiet-Collier, M.; Gueulette, J. (Radiobiology Dept., C.E.N., Boere tang, 200, B-2400 Mol, Belgium). *Radiat. Res.* 71(2):338-354; 1977.

To investigate recovery mechanisms in radiation- duced intestinal injury, the histological appea of duodenal mucosa in BALB/c+ mice was studied after fractionated abdominal irradiation with d doses of 200 and 350 rads. After 200 rad/day (rad/week), the average number of nuclei per tan tial section of crypts increased in two steps a reached 117, 112, 151, 140, and 145% of the con value after, 2, 3, 4, 5, and 6 weeks, resp. Th

ıverage numbers of mitoses and of [^{3}H]thymidine-
.abeled nuclei per crypt also increased to 155, 155,
.60, 207, and 221% and 190, 140, 131, 192, and 230%
ıf the controls, resp. In mice that received 350
ads/day, the number of nuclei per crypt increased
t about the same rate as in those given 200 rads,
nd the increase in the number of mitoses per crypt
nd in the mitotic index was more rapid and more
ronounced than in those given 200 rads; however,
ost animals that received 350 rads died before the
nd of the 4th week. These data suggest an in-
rease in the stem cell compartment, which is esti-
ated at 1.4 times its normal value after 4-6 weeks.
he length of the mitotic cycle (T_c) was measured
sing the usual [^{3}H]thymidine labeling technique
fter 5,000 rad/5 weeks, given in daily fractions of
00 rad. T_c was reduced from 14 to 9 hr, this re-
uction mainly concerning the G_1 phase (from 5 to
hr) and to a smaller extent the S phase (from 7
o 6 hr). Intestinal mucosa tends to compensate
or cell destruction by two mechanisms: a reduction
n the duration of the mitotic cycle and an increase
n the size of the stem cell compartment. At 200
ad/day, an important compensation is achieved, and
he animals are able to tolerate the irradiation for
bout 6 weeks. At 350 rad/day, however, increased
ell production can no longer compensate for cell
estruction, and the animals die after the third
eek.

468 DISTRIBUTION OF VASOACTIVE INTESTINAL POLYPEPTIDE (VIP) IN THE RAT AS MEASURED
Y RADIOIMMUNOASSAY AND BY RADIORECEPTORASSAY.

're.) Besson, J.; Dupont, C.; Laburthe, M.;
ataille, D.; Rosselin, G. (Unite de Recherche de
labetologie, 184, rue du Faubourg Saint-Antoine,
-75571 Paris Cedex 12, France). *Ann. Endocrinol.*
'aris) 38(2):145-146; 1977.

ıe vasoactive intestinal polypeptide (VIP) content
various rat tissues was measured using a radio-
mmunoassay. The intestinal tract contained 98.5%
the VIP, with the jejunoileal section having
ıe largest quantities (59%). The brain content of
P measured 1.5% of the total. The biological
tivity of the VIP extract was confirmed with a
adioreceptorassay using liver plasma membranes as
ıe specific target tissue. The jejunoileal values
tained during this study were almost identical
.th both assay techniques. The high concentrations
VIP in these tissues suggest a role of this pep-
.de in physiological phenomena.

69 EFFECT OF LOCAL CIRCULATORY ARREST ON THE STRUCTURE OF THE ENTEROCYTES OF THE ISO-
TED INTESTINAL LOOP.

(Eng.) Varkonyi, T.; Witt-
nn, T.; Varro, V. (Univ. Medical Sch., H-6701
eged, Hungary). *Digestion* 15(4):295-302; 1977.

ıe ultrastructural effects of anoxia were studied
isolated canine loops of small intestine after
perimental mesenteric obstruction. The arterial
rculation of two adjacent intestinal segments in
ch of six dogs was arrested by clamping, and
opsies were taken 1, 3, 5, 7, and 15 min after
amping. Isotonic glucose was placed in one loop before clamping, while the other remained empty. In the empty loop, mucosal changes were first seen after 3 min of anoxia. Cytoplasmic protrusions occurred on the luminal surface of the enterocytes. The endoplasmic reticulum was also altered. By 15 min after the induction of anoxia, the development of the cytoplasmic protrusions progressed to fusion of the microvilli and breakdown of the microvillous structure. The cytoplasm was vacuolated. Filling the intestinal lumen with isotonic glucose prevented these changes. This fact suggests that intrinsic cellular energy sources can be supplemented by intraluminal glucose.

5470 THE EFFECT OF ACIDIFYING THE DUODENAL CONTENTS ON SPLANCHNIC BLOOD FLOW.

(Eng.) Benyo, I.; Jakab, F.; Sugar, I.; Szabo, G. (Semmelweis Univ. Medical Sch., Budapest, Hungary). *Acta Hepatogastroenterol.* 24(3):201-204; 1977.

The effect of duodenal acidification on splanchnic circulation was studied in mongrel dogs under pentobarbital anesthesia to examine whether increased blood flow in the liver is due to intrahepatic vascular changes or to dilation in the mesenteric vascular bed. Electromagnetic blood flow meters monitored the common hepatic arterial and portal venous flow, while 0.1 N or 0.5 N hydrochloric acid, 30% glucose solution, or physiologic saline was introduced via plastic tubes into the upper duodenum and jejunum. Acidifying the duodenal contents with 3 ml/kg of 0.1 N hydrochloric acid increased both hepatic artery and portal venous flow 24.7%, and reduced mesenteric vascular resistance as well as hepatic artery and portal venous inflow resistances by -32.5%, -25.3%, and -11.2%, resp. After intraduodenal injection of 30% glucose and physiological saline solutions, the reaction was absent. More concentrated acid led to a greater increase in blood flow. The receptors of the circulatory reflex are situated in the duodenal mucosa and can be blocked with 1% lidocaine, indicating that neurogenous factors have a definite role in the control of vascular flow by the duodenal mucosa.

5471 ALTERATIONS OF CELLULAR PROLIFERATION IN THE ILEAL EPITHELIUM OF SUCKLING AND WEANED RATS: THE EFFECTS OF ISOPROTERENOL.

(Eng.) Klein, R. M. (Univ. Kansas Medical Center, 39th St. and Rainbow Blvd., Kansas City, KS 66103). *Cell Tissue Kinet.* 10(4):353-364; 1977.

Cell proliferation in the rat ileum was compared before and after neonatal closure to macromolecules, and the effects of the sympathomimetic amine, isoproterenol (IPR), on cell cycle parameters were determined. The pre-closure ileum was represented by 8-day-old rat ileum and the post-closure ileum by 28-day-old rats. The duration of the cell cycle phases was determined by the percentage of labeled metaphases technique (PLM) with computerized analysis of the curves. The generation cycle time was longer in 8-day-old suckling rats (18.63 hr) as compared to the older weaned rats (11.85 hr), and most of this 6.78 hr difference was in the G_1-period (4.5

hr). Other proliferative indices were also lower in the suckling rats: mitotic index (1.9 ± 0.4% as compared to 6.7 ± 0.9%), labeling index (26.8 ± 2.5% versus 44.2 ± 2.6%), and migration rate measured as percent labeled villus cells (8.9 ± 3.1% versus 45.2 ± 3.4%). IPR inhibited cellular proliferation in the ileal epithelium of both age groups. The cell cycle of the ileal epithelium of 8-day-old rats was lengthened from 18.63 to 21.07 hr and of 28-day-old rats from 11.85 to 13.98 hr. IPR produced a decrease in mitotic index from 1.9 ± 0.4% to 1.6 ± 0.4% in pre-closure ileum and from 6.7 ± 0.9% to 5.1 ± 0.6% in post-closure ileum. Labeling index decreased from 26.8 ± 2.5% to 20.0 ± 2.0% in 8-day-old rats and from 44.2 ± 2.6% to 31.1 ± 3.0% in 28-day-old rats after IPR administration. There were also significant differences in growth fraction between age groups and a significant decrease in growth fraction after IPR treatment. It appears that β-adrenergic stimulation has an inhibitory effect on neonatal ileal epithelium.

5472 THE EFFECT OF TRANSPOSITION TO JEJUNUM ON EPITHELIAL CELL KINETICS IN AN ILEAL SEGMENT. (Eng.)

Rijke, R. P. C.; Hanson, W. R.; Plaisier, H. M. (Erasmus Univ. Rotterdam, P.O. Box 1738, Rotterdam, Netherlands). *Cell Tissue Kinet.* 10(4):399-406; 1977.

To clarify the regulatory mechanisms underlying epithelial cell renewal in the small intestine, epithelial cell kinetics were studied in ileal segments of rats after transposition to proximal jejunum. The number of cells per villus column in the transposed ileum increased after 4-7 days, and reached normal values for the jejunum after 14-30 days. This increase was accompanied by a simultaneous increase in the number of cells per crypt column up to 130% of values in jejunum and ileum *in situ*. The percentage of labeled crypt cells, after labeling with ^{3}H-thymidine, and the relative size of the proliferative cell compartment in the crypt in the transposed ileum did not differ from values in the ileum *in situ* at any time interval after surgery. The total proliferative activity per crypt, which was determined by scintillation counting of isolated crypts after ^{3}H-thymidine labeling, increased twofold from 7 days after surgery. Cell migration studies showed that the increase in the number of villus cells was probably not caused by a change in the life span of the epithelial cells. The increase in the number of villus cells in ileal epithelium after transposition to proximal jejunum appears to be brought about by an enlargement of the crypt, while the relative size of the proliferative cell compartment in the crypt remains unchanged.

5473 SIMPLE METHOD FOR THE PREPARATION OF SINGLE CELL SUSPENSIONS FROM NORMAL AND TUMOROUS RAT COLONIC MUCOSA. (Eng.)

Perret, V.; Lev, R.; Pigman, W. (New York Medical Coll., Valhalla, NY 10595). *Gut* 18(5):382-385; 1977.

A procedure for obtaining viable single cell suspensions from young Fisher rat colonic epithelium by using phosphate buffered saline containing 0.2 M mannitol is described. The method, which requires antibiotic treatment but no prior enzyme treatment provides undamaged cells in high yield within 1 hr The procedure was also applied to neoplastic rat colonic tissue, which had been induced by repeated intrarectal infusion of *N*-methyl-*N*-nitrosourea. C parison between normal and neoplastic cells showed that neoplastic cells had a higher nucleus:cytoplasm ratio and a higher metabolic activity. The use of mannitol supplement for prolonged viability in both normal and neoplastic cell cultures is recommended.

5474 MORPHOLOGICAL STUDIES OF CHEMICALLY INDUCED COLON TUMORS IN HAMSTERS. (Eng.)

Winneker, R. C.; Tompkins, M.; Westenberger, P.; Harris, J. (Dept. Physiology and Biophysics, Univ Illinois, Urbana, IL 61801). *Exp. Mol. Pathol.* 27(1):19-34; 1977.

The progressive histopathological changes in the colons and livers of 48 hamsters subjected to weekly s.c. injections of 1,2-dimethylhydrazine (DMH) for 21 weeks were studied by sacrificing animals on a weekly basis. After 15 injections, (20 mg/kg), all remaining animals (n=17) displaye neoplastic lesions of the colon. Of the 17 animals, 10 exhibited adenocarcinomas *in situ*. Of the remaining seven which showed invasive adenocarcinomas of the colon, five animals also revealed metastatic lesions in the liver. Tumor pr gression followed the course of colonic enteritis (5 weeks), focal atypias (7 weeks), glandular dys plasias (10-14 weeks), carcinomas *in situ* (15 wee and invasive adenocarcinomas (17 weeks). Ultrastructural features of both tumors and normal ham ster colon were studied. Alterations in nuclear contour, size of intercellular spaces, and shape and density of luminal microvilli were noted. These studies show that the toxic effect of DMH o the liver is pronounced and is associated with certain progressive morphological changes.

5475 ISCHAEMIC COLITIS IN THE EXPERIMENTAL ANIMAL. I. COMPARISON OF THE EFFECTS ACUTE AND SUBACUTE VASCULAR OCCLUSION. (Eng.)

Matthews, J. G. W.; Parks, T. G. (Dept. Surgery, Queen's Univ., Belfast, Northern Ireland). *Gut* 17(9):671-676; 1976.

A study was undertaken to compare the effects on the colon of acute vascular interruption with th effects of a more gradual occlusion of the same vessels. Two group of dogs were studied, having either acute ligation of the common colic and caudal (inferior) mesenteric arteries (group I) acute ligation of the common colic artery and gr ual occlusion of the caudal mesenteric artery (group II). In group I, acute ligation caused ischemic colitis in all five dogs tested, but no died. Within the first 36 hr of the acute ligat bleeding was present in two dogs and diarrhea an sigmoidoscopy changes in all the dogs ($p<0.005$). The most prominent pathological features, mucosa edema and ecchymoses, were present sometimes as early as 4 hr after the acute vascular ligation.

Edema and swelling of the mucosal folds led to the formation of narrow grooves between adjacent folds which, when filled with barium, gave a saw-tooth margin to the bowel. Thumb-printing was demonstrable 12-24 hr after acute ligation and pseudotumor formation usually followed within the next 24-48 hr. Regression of the endoscopic appearance to normal was reported within 10-21 days. In group II, the dogs had no sign of diarrhea or bleeding. There was no evidence of ischemic colitis over a 2- to 3-week period. These findings suggest that the collateral blood vessels are capable of providing adequate circulation to the dog's colon, but that they do not open up rapidly enough to prevent ischemic change when the two major arteries are acutely ligated.

5476 ISCHAEMIC COLITIS IN THE EXPERIMENTAL ANIMAL. II. ROLE OF HYPOVOLAEMIA IN THE PRODUCTION OF THE DISEASE.

(Eng.) Matthews, J. G. W.; Parks, T. G. (Dept. Surgery, Queen's Univ., Belfast, Northern Ireland). *Gut* 17(9):677-684; 1976.

A study was undertaken to investigate the role of reduced perfusion pressure in the etiology of ischemic colitis. Three groups of five dogs each were studied: group 1, hypovalemia alone, induced by the removal of 30% of the dog's blood volume; group 2, acute ligation of the common colic artery and gradual occlusion of caudal mesenteric artery followed 4 weeks later by hypovolemia; and group 3, acute ligation of the caudal mesenteric artery with hypovolemia induced immediately after the ligation procedure. Hypovolemia alone did not lead to ischemic colitis but may lead to a 50-75% reduction in mesenteric blood flow without producing any signifi-cant change in the systemic blood pressure. In group 2 all five animals developed ischemic colitis. Microvascular thrombosis was a common pathological ntity and was associated with the formation of esicles and their subsequent ulceration and hemorrhage (diarrhea and sigmoidoscopy changes, $p<0.005$). n group 3, the affected segment was localized, and leeding was profuse (diarrhea and bleeding, <0.02; sigmoidoscopy changes, $p<0.005$). In animals with severe ischemic involvement of the colon, "thumbprinting" and pseudotumors became demon-trable. These findings suggest that states of low lood flow in the presence of previous arterial onstriction or blockage may lead to sufficient re-uction in mesenteric perfusion for intestinal schemia to develop.

477 BENEFICIAL EFFECT OF ALCOHOL IN EXPERIMENTAL DUMPING SYNDROME IN DOGS: RELATION O BLOOD KININS.

(Eng.) Chaimoff, C.; Edery, H.; braham, S.; Gassner, S. (Beilinson Hosp., Petah kva, Israel). *Isr. J. Med. Sci.* 13(6):617-620; 977.

e influence of ethanol on experimentally induced mping syndrome (DS) was studied in dogs, and rticular attention was paid to its relation to e level of blood kinins. Shortly after the tra-intestinal infusion of a 50% glucose solution 50 ml), somatic symptoms (salivation, rhinorrhea, diarrhea, vomiting) and behavior disturbances occurred in all four dogs tested. When 10-12 ml of brandy (40% ethanol) were infused intra-intestinally 15-20 min before glucose administration, only mild symptoms of DS were observed in all five animals studied. Only mild symptoms of discomfort were noted in three dogs given glucose and brandy simultaneously. No abnormal changes were noted in dogs given brandy alone. No kinin activity was found in control blood samples or in those obtained after the administration of brandy alone or brandy together with glucose. Concomitant with the appearance of DS in the animals that received glucose alone, plasma kinin activity ranging from 0.4 to 1.6 ng/ml was detected in the first samples (15 min after infusion) of arterial and venous blood. The kinin level gradually increased in the subsequent blood samples (20 and 25 min) and reached a peak concentration of 50 ng/ml. In three of the five dogs that received brandy before glucose no kinins were found, whereas in the other two dogs 50 ng/ml were found in the second and third venous samples. The results suggest that a small amount of ethanol, drunk before meals, may be beneficial in alleviating DS symptoms in man, probably by interfering with the kinin system.

5478 ENDOSCOPIC LASER TREATMENT. II. COMPARISON OF THE EFFICACY OF HIGH AND LOW POWER PHOTOCOAGULATION IN CONTROL OF SEVERELY BLEEDING EXPERIMENTAL ULCERS IN DOGS.

(Eng.) Silverstein, F. E.; Protell, R. L.; Piercey, J.; Rubin, C. E.; Auth, D. C.; Dennis, M. (Dept. Medicine, RG-20, Univ. Washington, Seattle, WA 98195). *Gastroenterology* 73(3):481-486; 1977.

The coagulative efficacy of a "high power" argon laser that delivers 6.5 ± 1.0 watts (W) was compared in dogs to that of a "low power" argon laser that delivers 1.0 ± 0.1 W. The wave-guide angle of divergence was 8 degrees. For the high power laser, the distance between the wave-guide tip and the mucosa was 1.0-1.5 cm with a delivered power density range of 160-487 W/cm^2. For the low power-laser, the distance between the tip and mucosa was 0.7-1.3 cm with a power density of 35-146 W/cm^2. Group A consisted of acute experiments in six heparinized dogs in which 51 standard-sized acute gastric ulcers extending into the submucosa were made at laparotomy via a large gastrotomy. Ulcer bleeding rates were quantified into three categories of severity. Within each category, ulcers were randomized to high power, low power, or untreated control. All 19 low power-treated ulcers and 16 untreated controls continued bleeding; 13 of 16 high power-treated ulcers stopped bleeding completely. Representative ulcers were examined histologically. Group B consisted of chronic experiments on 31 ulcers in 7 unheparinized dogs. These ulcers were either treated with high power or left as untreated controls. Dogs were killed and the ulcers were examined histologically at 7, 14, and 28 days. Only rarely did the laser injury penetrate into the muscularis externa. There were no perforations. By 14 days, all lesions were covered with normal surface epithelium. These data encourage further development of approx 7.0 W argon laser photocoagulation for eventual clinical use in man.

5479 THE EFFECT OF PORTACAVAL SHUNT ON THE ACTIVITY OF THE MITOCHONDRIA AND THE ABSORPTION OF GLUTAMATE IN RAT BRAIN.

(Ita.) Vassanelli, P.; Garbin, L. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita di Padova, Padova, Italy). *Acta Chir. Ital.* 31(2): 287-293; 1975.

A study was made of the effect of portacaval shunt on mitochondrial activity and glutamate absorption in the rat brain. Male Sprague-Dawley rats were given a portacaval shunt and divided into two groups. One group was sacrificed 1 month and the other 12 months following surgery. ^{14}C-labeled glutamic acid was given i.p. 5 and 10 min before sacrifice. Glutamic acid was separated from other amino acids by paper chromatography and radioactivity was determined by liquid scintillation counting. Mitochondrial activity, as measured by the utilization of succinate, glutamate, and α-ketoglutarate, was not affected by the portacaval shunt. Uptake of ^{14}C-glutamate was markedly enhanced in animals that received the shunt. The major portion of the ^{14}C-label was present in γ-amino butyric acid (GABA). The enhanced uptake of glutamic acid appears to be directly correlated with increased production of GABA following portacaval shunt operations.

5480 STRUCTURE OF HEPATITIS B DANE PARTICLE DNA AND NATURE OF THE ENDOGENOUS DNA POLYMERASE REACTION.

(Eng.) Landers, T. A.; Greenberg, H. B.; Robinson, W. S. (Univ. Texas Medical Sch., Houston, TX 77030). *J. Virol.* 23(2):368-376; 1977.

The circular DNA of hepatitis B Dane particles was analyzed by electrophoresis before and after a polymerase reaction and after digestion by restriction endonuclease or single-strand-specific endonuclease S1. The unreacted molecules extracted from the particles were electrophoretically heterogeneous, and treatment with S1 nuclease produced double-stranded linear DNA ranging in length from 1,700 to 2,800 base pairs (bp). After an endogenous DNA polymerase reaction, two discrete species of DNA molecules were found: a circular form and a linear form 3,200 bp long. The reaction resulted in a population of molecules with an elongated and more homogeneous double-stranded region. These results suggest that the circular molecules in Dane particles have single-stranded regions of varying lengths that are made double stranded during the DNA polymerase reaction. The endogenous DNA polymerase was found to initiate apparently at random in a region spanning more than a third of the molecule. Analysis of restriction endonuclease cleavage fragments of the fully elongated DNA revealed that although the molecules were of a uniform length, they were somewhat heterogeneous in sequence. The sum of the sizes of the 10 major endonuclease *Hae* III-generated fragments, detected by ethidium bromide, was 3,880 bp. Two additional fragments (B and G) detected by autoradiography after an endogenous DNA polymerase reaction with ^{32}P-labeled deoxynucleoside triphosphates made the total 4,910 bp. The biological utility of a circular DNA that is single stranded over one-third of its length and a virion enzyme that closes the single-stranded region for a virus such as hepatitis B virus is unclear; such feature have not been described for other viruses.

5481 FOREIGN SERUM-INDUCED PANCREATITIS IN MICE. II. SECRETORY DISTURBANCES OF ACINAR CELLS.

(Eng.) Nevalainen, T. J.; Fowlie, F. E.; Janigan, D. T. (Dept. Pathology, Dalhousie Univ., Halifax, Nova Scotia, Canada). *Lab. Invest* 36(5):469-473; 1977.

An investigation was undertaken in mice to study the mechanism of granule accumulation, the increas in granule enzyme activities, and the relation of these phenomena to the development of acinar c death following necrosis after one i.p. injection of foreign serum (0.85 ml). Enlargement of the pancreas was reported due to an increase in the number of zymogen granules in non-necrotic cells. Three hours after the injection, pancreatic amyla activity was 116.6 ± 8.8 units/mg wet weight in r pients of fresh serum as compared to 80.7 ± 4.0 U wet weight of heated serum recipients ($p=0.01$) an continued to increase in recipients of fresh seru for the 12-hr period studied ($p=0.001$). These ch were coupled with a progressive decrease in the s tory response to pilocarpine (5 mg/ml) and were p ceeded by significant disturbances in the pancrea tissue concentrations of sodium (increased 3 hr a injection, $p<0.001$) and potassium (decreased 3 hr after injection, $p<0.001$). An injury mechanism w reported which permits granule formation to proceed in the face of impaired granule exocytosis. The granule secretory process is reported to be more sensitive than the zymogen synthesis process to the serum injury mechanism. Acinar cell necrosis was maximal by 12-15 hr. It is concluded that increase in granules is neither the primary determinant nor the initiator of acinar cell deat It is suggested that disturbance in plasma membra functions leads to acinar cell death.

5482 EXPERIMENTAL PANCREATICODUODENAL ALLOTR PLANTATION: STUDIES IN THE UNIMMUNOSUP PRESSED PIG.

(Eng.) Jensen, S. L.; Nielsen, O. V.; Kuhl, C.; Petri, M. (Rigshospitalet, Blegdamsvej 9, DK-2100 Copenhagen, Denmark). *Dan. Me Bull.* 24(2):55-60; 1977.

A study was undertaken to investigate pancreatico duodenal allotransplantation in unimmunosuppresse pigs and the insulin secretion of the allograft. Healthy white Landrace pigs were used, and donor and recipient were from the same breed. Total pa createctomy was always performed in the recipient pig following one of three protocols. In group 1 (n=10), total pancreatectomy was performed immediately after pancreaticoduodenal grafting. All pigs in this group died within 15 days (mean survival time 4.6 days). In group 2 (n=12), total pancreatectomy was performed 1 week after pancreaticoduodenal grafting. The mean survival tim of these pigs was 34.0 days (range 11-98 days). Normal pancreatic tissue appearance was reported on gross and microscopic examination in all pigs that did not die from vascular thrombosis or rejection. Hyperinsulinemia persisted in all recipients until death or rejection of the graft. Pigs in group 3 (n=5) were subjected to total pancreatectomy alone and served as the control group. These pigs developed hyperglycemia and severe ketoacidosis; their mean survival time was 3.0 days. Plasma from these pigs contained 5-10 μU/ml serum insulin before death. Residual pancreatic tissue was not identified at autopsy. The pig is a useful experimental animal for the study of pancreaticoduodenal transplantation.

5483 CANINE HISTIOCYTIC ULCERATIVE COLITIS: AN ULTRASTRUCTURAL STUDY OF THE EARLY MUCOSAL LESION. (Eng.) Gomez, J. A.; Russell, S. W.; Trowbridge, J. O.; Lee, J. (Scripps Clinic and Res. Foundation, 476 Prospect St., La Jolla, CA 92037). *Am. J. Dig. Dis.* 22(6):485-496; 1977.

5484 INCREASED HEPATIC SYNTHESIS OF CHOLESTEROL FOLLOWING JEJUNOILEAL BYPASS. (Eng.) Grosfeld, J. L.; Harris, R. A.; Csicsko, J. F.; Cooney, D. R.; Madura, J. A. (J. W. Riley Hosp. for Children, 1100 W. Michigan St., Indianapolis, IN 46202). *Surgery* 81(6):701-707; 1977.

5485 PROXIMAL-DISTAL ABSORPTIVE GRADIENTS IN THE IN VIVO INTESTINE OF NORMAL AND INFECTED (Hymenolepis diminuta: CESTODA) RATS. (Eng.) Podesta, R. B.; Mettrick, D. F. (Dept. Zoology, Univ. Toronto, Toronto, Ontario M5S 1A1, Canada). *Can. J. Physiol. Pharmacol.* 55(4):791-803; 1977.

5486 INTESTINAL MOTILITY DURING THE ENTERIC PHASE OF TRICHINOSIS IN IMMUNIZED RATS. (Eng.) Castro, G. A.; Post, C. A.; Roy, S. A. (Univ. Texas Medical Sch., Houston, TX 77030). *J. Parasitol.* 63(4):713-719; 1977.

5487 BILIARY AND INTESTINAL PATHOLOGY IN MICE INFECTED WITH Hymenolepis microstoma, AS DETERMINED BY SCANNING ELECTRON MICROSCOPY. (Eng.) Pappas, P. W.; Schroeder, L. L. (Dept. Zoology, Ohio State Univ., Columbus, OH 43210). *J. Parasitol.* 63(4):762-764; 1977.

5488 ACUTE EROSIVE GASTRITIS INDUCED BY ASPIRIN, KETOPROFEN, IBUPROFEN, AND NAPROXEN: ITS PREVENTION BY METIAMIDE AND CIMETIDINE. (Eng.) Mann, N. S.; Sachdev, A. J. (800 Zorn Ave., Louisville, KY 40202). *South. Med. J.* 70(2):562-564; 1977.

489 THE EARLY EXPRESSION OF PROTECTIVE IMMUNITY TO Fasciola hepatica IN RATS. (Eng.) Hayes, T. J.; Mitrovic, M. (Animal Health Res. Dept., Hoffmann-La Roche, Inc., Nutley, NJ 07110). *J. Parasitol.* 63(3):585-587; 1977.

5490 THE EFFECT OF CHANGES IN ARTERIAL PCO_2 ON COLONIC BLOOD FLOW IN THE DOG [Abstract]. (Eng.) Gilmour, D. G.; Hothersall, A. P.; Aitkenhead, A. R.; Ledingham, I. McA. (No affiliation given). *Scot. Med. J.* 22(2):187; 1977.

5491 TECHNIQUES OF DRUG ASSAY IN PLASMA. (Eng.) Anonymous. (No affiliation given). *Med. J. Aust.* 1(10):317-319; 1977.

5492 HIGH FLOW FAILURE OF THE LYMPH CIRCULATION. (Eng.) Witte, C. L.; White, M. H.; Dumont, A. E. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Vasc. Surg.* 11(3):130-151; 1977.

5493 IMMUNE FUNCTION IN DISORDERS OF THE LYMPH CIRCULATION. (Eng.) Van Wyck, D. B.; Lucas, D. O. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Vasc. Surg.* 11(3):152-159; 1977.

5494 SECRETION OF GASTRIC JUICE AND FUNCTION OF THE EXOCRINE PANCREAS AFTER VAGOTOMY OR BILLROTH II RESECTION. (Eng.) Kruse-Jarres, J. D.; Waldmann, D.; Hirschauer, M.; Kuchel, F.; Staiger, H. J.; Hartung, H. (Dept. Surgery, Univ. Freiburg, Freiburg, W. Germany). *Abdom. Surg.* 19(3):58-63; 1977.

5495 DIVALENT CATION TRANSPORT BY RAT CECUM AND COLON IN CALCIUM AND MAGNESIUM DEFICIENCY. (Eng.) Petith, M. M.; Schedl, H. P. (Univ. Iowa Hosp., Iowa City, IA 52242). *Proc. Soc. Exp. Biol. Med.* 155(2):225-229; 1977.

5496 CHEMOTHERAPEUTIC EFFECTS OF A NITRODIPHENYLAMINOISOTHIOCYANATE (C9333-Go/CGP4540) ON JIRDS INFECTED WITH Brugia pahangi. (Eng.) Saz, H. J.; Dunbar, G. A.; Bueding, E. (Dept. Biology, Univ. Notre Dame, Notre Dame, IN 46556). *Am. J. Trop. Med. Hyg.* 26(3):574-575; 1977.

5497 EXPERIMENTAL AMEBIASIS. II. HEPATIC AMEBIASIS IN THE NEWBORN HAMSTER. (Eng.) Mattern, C. F. T.; Keister, D. B. (Natl. Inst. Allergy and Infectious Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Am. J. Trop. Med. Hyg.* 26(3):402-411; 1977.

5498 RELATION BETWEEN BONE MINERALIZATION, Ca ABSORPTION, AND PLASMA Ca IN PHOSPHONATE-TREATED RATS. (Eng.) Trechsel, U.; Schenk, R.; Bonjour, J. P.; Russell, R. G. G.; Fleisch, H. (Dept. Pathophysiology, Univ. Berne, Berne, Switzerland). *Am. J. Physiol.* 232(3):E298-E305; 1977.

5499 THE EFFECT OF DIETARY SUCROSE ON THE METABOLISM OF PENTOBARBITONE [Abstract]. (Eng.) Nash, A. H.; Bender, A. E. (Dept. Nutrition, Queen Elizabeth Coll., London W8 7AH, England). *Proc. Nutr. Soc.* 35(3):132A; 1976.

5500 GENERALIZED CONSIDERATIONS OF ADMINISTRATION ROUTE DEPENDENCE OF DRUG DISPOSITION AND USE OF URINARY DATA FOR PREDICTION OF THE DEPENDENCE. (Eng.) Awazu, S.; Oguma, T.; Iga, T.; Hanano, M. (Faculty Pharmaceutical Sciences, Univ. Tokyo, Bunkyo-ku, Hongo, Tokyo, Japan). *Chem. Pharm. Bull.* 25(4):680-689; 1977.

5501 PREPARATION OF A CHRONIC GASTRIC FISTULA IN THE RAT. (Eng.) Pare, W. P.; Isom, K. E.; Vincent, G. P., Jr.; Glavin, G. B. (Veterans Admin. Hosp., Perry Point, MD 21902). *Lab. Anim. Sci.* 27(2):244-247; 1977.

5502 STRESS GASTRIC BLEEDING: PREVENTION OF EXPERIMENTAL LESIONS BY INTRAVENOUS HYPERALIMENTATION. (Eng.) Deysine, M.; Katzka, D.; Rosario, E. (Mt. Sinai SCh. Medicine, City Univ. New York, Fifth Ave. & 100th St., New York, NY 10029). *Am. J. Gastroenterol.* 67(2):152-156; 1977.

5503 INTESTINAL BLOOD FLOW IN THE DOG MEASURED BY INDICATOR FRACTIONATION WITHOUT TISSUE SAMPLES. (Eng.) Eade, M. N.; Reid, I. R.; Quinn, J. P. (Sch. Medicine, Univ. Auckland, Private Bag, Auckland, New Zealand). *Clin. Exp. Pharmacol. Physiol.* 4(3):235-245; 1977.

5504 PARTIAL PURIFICATION OF Fasciola hepatica ANTIGEN FOR THE IMMUNODIAGNOSIS OF FASCIOLIASIS IN RATS. (Eng.) Hillyer, G. V.; Santiago de Weil, S. (Dept. Biology, Univ. Puerto Rico, Rio Piedras, PR 00931). *J. Parasitol.* 63(3):430-433; 1977.

5505 ACTION OF SOME PANCREATIC ENZYMES ON Vibrio cholerae. (Eng.) Felsenfeld, O.; Gyr, K. (Tulane Univ. Delta Regional Primate Res. Center, Covington, LA 70433). *Med. Microbiol Immunol.* 163(1):53-60; 1977.

5506 STUDIES ON THE PATHOGENESIS OF Schistoso
mansoni IN THE KIDNEY OF THE SWISS ALBI
MOUSE [Abstract]. (Eng.) Abdel-Hafez, S. K. (Ru
gers Univ., New Brunswick, NJ). *Diss. Abstr. Int.*
[*B*] 37(6):2704B; 1976.

5507 HOST ANTIGENS AND PARASITE ANTIGENS OF
MURINE Schistosoma mansoni. (Eng.)
Goldring, O. L.; Sher, A.; Smithers, S. R.; McLar
D. J. (Natl. Inst. Medical Res., Mill Hill, Londo
NW7 1AA, England). *Trans. R. Soc. Trop. Med. Hyg*
71(2):144-148; 1977.

5508 EFFECT OF IRON AND PROTEIN DEFICIENCY O
THE EXPULSION OF Nippostrongylus brasil
sis FROM THE SMALL INTESTINE OF THE RAT. (Eng.)
Bolin, T. D.; Davis, A. E.; Cummins, A. G.;
Duncombe, V. M.; Kelly, J. D. (Prince of Wales Ho
New South Wales, Australia). *Gut* 18(3):182-186;
1977.

5509 STUDIES ON IMMUNE RESPONSES TO LARVAL
CESTODES IN MICE. INCREASED SUSCEPTIBI
ITY OF CERTAIN MOUSE STRAINS AND HYPOTHYMIC MICE
Taenia taeniaeformis AND ANALYSIS OF PASSIVE TRAN
FER OF RESISTANCE WITH SERUM. (Eng.) Mitchell,
G. F.; Goding, J. W.; Rickard, M. D. (Royal Melbourne Hosp. P.O., Victoria, 3050, Australia).
Aust. J. Exp. Biol. Med. Sci. 55(2):165-186; 197

See also, 5266, 5271, 5274, 5310, 5322, 5355, 53
5393, 5454, 5462, 5537, 5541, 5547, 55
5945.

DIAGNOSTIC PROCEDURES

510 ^{13}C-TRIOCTANOIN: A NONRADIOACTIVE BREATH TEST TO DETECT FAT MALABSORPTION. (Eng.)

atkins, J. B.; Schoeller, D. A.; Klein, P. D.;
tt, D. G.; Newcomer, A. D.; Hofmann, A. F. (Chil-
ren's Hosp. Medical Center, 300 Longwood Ave.,
ston, MA 02115). *J. Lab. Clin. Med.* 90(3):422-
30; 1977.

detect fat malabsorption in children and in women
child-bearing age without radiation hazard, the
e of trioctanoin labeled with the stable, non-
dioactive isotope ^{13}C was inaugurated and valida-
d for use in a CO_2 breath test. The validation
sts with both ^{14}C- and ^{13}C-trioctanoin were con-
cted in 14 adult patients with varying degrees
fat malabsorption. The labels were excreted at
arly identical rates (r=0.97). After estab-
shment of dose requirements and measurement of
dogenous $^{13}CO_2$ production rates, nine children
ed 3 months to 5 yr were evaluated for fat mal-
sorption. The results obtained with the ^{13}C-tri-
tanoin breath test were compared to those ob-
ined by a quantitative 72 hr fat balance study.
e cumulative excretion of $^{13}CO_2$ by 2 hr was 25 ±
5% of the dose in patients with normal fat ab-
rption and provided a clear differentiation
<0.001) from the 3.5 ± 2.5% of the dose excreted
those with steatorrhea due to untreated pan-
eatic insufficiency resulting from cystic fibrosis.
ak $^{13}CO_2$ levels occurred at 1.5 hr in both groups
th some overlap. Addition of exogenous pancreatic
zymes improved fat absorption and increased $^{13}CO_2$
cretion fourfold. The correlation between the per-
nt of fat intake excreted and the cumulative
O_2/mmol CO_2 excreted by 3 hr was very good (r=
.88) in all patients. These data indicate that
e ^{13}C-trioctanoin breath test provides accurate
tection of fat malabsorption in children with
ncreatic insufficiency. This noninvasive tech-
que is more convenient than 72 hr stool collec-
n and permits safe and sensitive metabolic
dies in children without exposure to radiation.

1 ELASTOLYTIC ACTIVITY OF THE HUMAN DUODENAL CONTENT. (Ger.)

Fric, P.; Slaby, J.;
afirek, E.; Malis, F. (II. Forschungslaboratorium
Gastroenterologie der Karlsuniversitat, Karlovo
. 32, 12111 Prague 2, Czechoslovakia). *Dtsch.
Verdau. Stoffwechselkr.* 36(3/4):239-244; 1976.

rease in duodenal elastase output following stim-
tion with pancreozymin (75 U, i.v.) and secretin
U, i.v.) was determined in 54 patients using
cinyltrialanine-*p*-nitranilide as substrate.
average elastase output during the 80 min after
mulation was 142.1 ± 21.4 μM in 24 controls,
2 ± 6.8 μM in 8 patients with functional insuf-
iency due to organic pancreatic changes, and 86.1
.7 μM in 24 patients with decreased amylase out-
. Two elastolytic fractions, possibly represent-
different activation phases of the elastase,
e found in the duodenal content by gel electro-
resis and DEAE-sephadex chromatography. The
ctions had the same molecular weight and K_m
,500 and 0.45 mM, resp.), but differed in their
ement and elution through different salt concentrations and in their behavior to synthetic and natural substrates.

5512 SIGNIFICANCE OF BACTERIAL STEROID DEGRADATION FOR THE ETIOLOGY OF LARGE BOWEL CANCER. VII. METHODOLOGY OF THE IDENTIFICATION OF DEGRADATION PRODUCTS OF BILE ACIDS. (Ger.)

Slemrova, J.; Edenharder, R. (Hygiene-Institut der Universitat, D-6500 Mainz 1, Hochhaus am Augustusplatz, W. Germany). *Zentralbl. Bakteriol.* [*Orig. B*] 164(3): 235-249; 1977.

The bacterial transformation products of cholic, chenodeoxycholic, and deoxycholic acids were identified by thin-layer and gas chromatography and mass spectrometry. *Bacteroides thetaiotaomicron* strains were used. The mean error of retention factors obtained with thin layer chromatography was too large to make a clear distinction between some bile acid transformation products with similar chromatographic properties. The influence of relative air humidity was decisive. This effect became apparent only after a certain threshold value was exceeded. A dependence of the retention factors on temperature and some mutual interferences between bile acids in mixtures were demonstrated. The gas chromatographic identification of trimethylsilyl ethers of bile acid methyl esters was complicated by methylation and silylation artifacts and the insufficient resolution power of packed columns; the gas chromatographic analysis, however, mainly gave correct results. Mass spectrometric identification was found to be the most reliable one. The reference spectra of five silylated bile acid methyl esters (lithocholic, deoxycholic, cholic, apocholic, and 3α,12α-dihydroxy-7-oxo-5β-cholanoic acid) and one silylated bile acid, trimethylsilyl ester, are presented. Combined gas chromatography-mass spectrometry is an analytical method well suited to study the bacterial transformation products of bile acids.

5513 SERUM IMMUNOGLOBULIN LEVELS IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Ger.)

Sailer, D.; Ullmann, B.; Berg, G. (Medizinische Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, Krankenhausstr. 12, 8520 Erlangen, W. Germany). *Dtsch. Med. Wochenschr.* 101(33):1214-1217; 1976.

IgA, IgG, and IgM levels were determined quantitatively by radial immunodiffusion in 50 patients with ulcerative colitis and 41 patients with Crohn's disease to establish possible diagnostic or prognostic value of disease-specific immunograms. In comparison to healthy controls, a slight decrease in IgG, IgA, and IgM was found in ulcerative colitis. In Crohn's disease, IgG levels were normal, IgA was increased by 37.3%, and IgM was decreased by 37%. Typical immunograms appear to be valuable in the differential diagnosis of Crohn's disease.

5514 INTESTINAL ALKALINE PHOSPHATASE IN THE DIAGNOSIS OF LIVER DISEASE. (Eng.)

Warnes, T. W.; Hine, P.; Kay, G. (Manchester Royal

Infirmary, Manchester, England). *Gut* 18(4):274-278; 1977.

The value of the newer techniques of isoenzyme analysis in the diagnosis of liver disease was evaluated in 76 patients, and the question of whether they are helpful in differentiating an intrahepatic from an extrahepatic cause of jaundice was studied. Alkaline phosphatase isoenzymes were studied by acrylamide gel disc electrophoresis in 15 patients with an extrahepatic lesion, 53 with an intrahepatic lesion, and 8 patients who had features of both intra- and extrahepatic disease. No intestinal band was found in the 15 cases of extrahepatic liver disease, in marked contrast to the patients with intrahepatic lesions in whom an intestinal band was found in 45% of cases. The intrahepatic group was heterogeneous, a high incidence of intestinal bands being found in patients with liver cirrhosis. It is concluded that where a raised serum alkaline phosphatase is found in a patient with jaundice, and a gut band is present on electrophoresis, the lesion is likely to be intrahepatic.

5515 COMPUTED TOMOGRAPHY OF THE LIVER. (Eng.) Stephens, D. H.; Sheedy, P. F., II; Hattery, R. R.; MacCarty, R. L. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Am. J. Roentgenol.* 128(4):579-590; 1977.

Experience with abdominal computed tomography (CT) in more than 600 liver examinations over a 10-month period using a system fast enough to eliminate respiratory motion is reported. CT was highly accurate, but not infallible, in detecting and defining space-occupying lesions, but was less helpful in detecting diffuse hepatic disease. Space-occupying lesions in the liver were detectable by CT when their attenuation of the x-ray beam differed appreciably from the attenuation by the surrounding tissue. The great majority of all intrahepatic masses discovered, whether solid or cystic, neoplastic or inflammatory, were of diminished radiographic density. Exceptions to this were lesions containing calcium or extravasated blood. In nine patients with clinically apparent cirrhosis, no outstanding alteration in hepatic density was seen on CT, although in two, the liver parenchyma had a slight nonspecific inhomogeneity. The diffuse process with the most impressive CT appearance was fatty infiltration, a finding noted in five patients. In this condition, the diminished parenchymal density was easily recognized by comparing it with the density of the spleen. The intrahepatic vessels stood out as relatively dense structures against the radiolucent background of hepatic parenchyma. In bile duct obstruction, the dilated ducts were easily recognized in most patients because of the low density of bile. Often, information about the obstructing lesion was also obtained. Masses in the porta hepatis and head of the pancreas were found in 7 of 13 patients with dilated ducts. In two other patients, the presence of a dilated pancreatic duct associated with dilated bile ducts established the site of obstruction as beyond the confluence of the common bile duct and pancreatic duct. The proper clinical role of CT in relation to other diagnostic methods, especially nuclear imaging, remains to be established.

5516 HEPATIC LYMPHOGRAPHY. (Jpn.) Sako, M. (Kobe Univ. Sch. Medicine, Kobe, Japan). *Nippon Acta Radiol.* 35(9):733-745; 1975.

Indirect lymphography of the liver using a new water soluble contrast medium consisting of 65% meglumine iodamide and 2% nonionic surfactant (polyoxyethylene hydrogenated castor oil) was carried out in dogs and in patients with liver cirrhosis, chronic hepatitis, and obstructive jaundice. The contrast medium (5 ml, 2 ml/min) was injected into the livers of anesthetized dogs. Several lymphatic vessels were well opacified. No significant cellular changes were observed. In 18 patients, 10-15 ml of the contrast medium was injected percutaneously into the liver parenchyma under local anesthesia. Several lymphatics were opacified, extending to the hilus; the lymphatics were tortuous and were interlaced, which distinguished them from the vascular system. Lymphographic visualization was obtained in all cases, and the hilar lymph node was opacified in five cases In the six patients with cirrhosis, the lymphatic vessels appeared irregular and tortuous; there was a characteristic ripple-like appearance, which was considered to be a distinctive feature of liver cirrhosis. The lymphatic vessels were irregular, and the margin was rigid in only two of the six cases of chronic hepatitis. In six patients with obstructive jaundice, the lymphatic vessels were mildly dilated and they had a beaded appearance. The patients experienced no untoward effects from this procedure. Hepatic lymphography using the new contrast medium demonstrates characteristic patterns in different liver diseases; this method may be a valuable adjunct to other examinations in the diagnosis of liver diseases.

5517 REFINEMENTS IN CHIBA NEEDLE TRANSHEPATIC CHOLANGIOGRAPHY. (Eng.) Ferrucci, J. T., Jr.; Wittenberg, J. (Massachusetts General Hosp and Harvard Medical Sch., Boston, MA 02114). *Am. J. Roentgenol.* 129(1):11-16; 1977.

Present techniques of Chiba needle transhepatic cholangiography, intraprocedure observations, and special interpretive considerations based on a series of 100 consecutive examinations are reviewed The established safety margin of this technique now permits up to 15 needle passes to obtain a cholangiogram; thus, success rates of duct opacific tion presently approach 100%. Special phenomena related to the small caliber of the needle include duct filling from "invisible" radicles, perivenous or periductal dissection of contrast, and pseudolesions in an incompletely decompressed stagnant bile column. In patients with suspected biliary obstruction, either i.v. cholangiography or gray scale ultrasonography (and/or computer tomography) should be used as the initial noninvasive study, as indicated by the serum bilirubin level. The

robability of duct opacification by i.v. cholangio-
graphy diminishes rapidly above total bilirubin
evels of 3 mg/100 ml, and thus cross-sectional
maging studies, radionuclide examinations, and
ngiography play only a secondary role. Direct
eedle cholangiography is still recommended for
recise delineation of the level and nature of
he obstructing lesion prior to surgery.

518 IMMUNOCHEMICAL STUDIES ON MACROMOLECULAR
GASTRINS: EVIDENCE THAT "BIG BIG GASTRINS"
RE ARTIFACTS IN BLOOD AND MUCOSA, BUT TRULY PRESENT
N SOME LARGE GASTRINOMAS. (Eng.) Rehfeld, J. F.;
chwartz, T. W.; Stadil, F. (Inst. Medical Biochem-
stry, Univ. Aarhus, DK-8000 Aarhus C, Denmark).
astroenterology 73(3):469-477; 1977.

he question of whether macromolecular gastrin--ear-
ier designated "big big gastrin" (BBG)--is present in
lood and tissue was evaluated by gel and affinity
hromatography monitored radioimmunochemically. Gel
hromatography on small Sephadex G-50 columns (10 by
00 mm) of serum from eight normal fasting subjects
onfirmed that apparent gastrin immunoreactivity is
luted in the void volume. However, in contrast to
he established serum gastrins (components I to IV),
he apparent serum BBG was not removed by affinity
hromatography. The amount of apparent BBG was
elated to the amount of proteins present in the
id volume fractions and to the ability of serum
oteins to interfere with the binding affinity of
ree different antisera used. Gel chromatography
Sephadex G-50 columns of antral, duodenal, and
junal extracts revealed gastrin in the void vol-
e only when large amounts of extracts were applied
the columns. By refiltration of these void vol-
e fractions the apparent BBG disappeared, and gas-
in immunoreactivity was now eluted corresponding
components I, II (gastrin-34 or "big" gastrin),
d III (gastrin-17 or "little" gastrin). In con-
ast to these findings, an extract of a large
strinoma, previously used to substantiate the
ture of BBG, contained a number of gastrin macro-
lecules with apparent molecular masses ranging
om 30,000 to 100,000 daltons. These gastrins,
fined as BBG by their elution in the void volume
Sephadex G-50 columns, were removed by affinity
romatography using antibodies specific for the
rboxyl terminal sequence of gastrin-17 from buffer
serum solutions. Elution in urea gradient on
hadex G-50 columns of extracts from three gas-
inomas additional disclosed BBG in one tumor.
results indicate that there are no detectable
e macromolecular gastrins in serum and non-neo-
stic gastrointestinal mucosa. The apparent BBG
attributable to interference in the gastrin assay
normal serum proteins or to weak noncovalent
tein-binding of smaller gastrins. In contrast,
e gastrin macromolecules consisting of gastrin-
covalently coupled in its amino-terminus to pro-
ns of varying length are present in detectable
unts in some large gastrinomas.

9 BASIC PRESSURE IN THE PANCREATIC DUCT AND
IN THE BILE DUCT: RESULTS FROM 50 STAND-
IZED DUODENOSCOPIC TRANSPAPILLARY PRESSURE MEASUREMENTS. (Ger.) Weiss, H. D.; Kramann, B.; Wuttke, V.; Anacker, H. (Institut fur Rontgendiagnostik, Ismaninger Strasse 22, D-8000 Munchen 80, W. Germany). *Med. Klin.* 72(12):519-523; 1977.

Duodenoscopic transpapillary pressure measurements of the common bile duct and pancreatic duct were made in 20 and 70 patients, resp., following premedication with atropine (0.5 mg i.m.), triflupromazine (10 mg i.m.), and meperidine (50 mg i.v.). Normal findings were noted on 42 occasions, whereas marked chronic recurrent pancreatitis was found twice, suspicion of chronic pancreatitis (3 times), papillary stenosis (1), pancreas carcinoma (1), and mucovisidosis (1). As a result of the 20 measurements in the common bile duct, gallstones were found in 8 patients, benign bile duct stenoses in 3, and normal findings in 9. The mean basic pressure values of the common bile duct were 12.0 cm H_2O (7.3-17.0 cm H_2O). Almost normal pressure was seen in cases of bile duct concretions (11.7 cm H_2O). However, a mean pressure of 32 cm H_2O was noted in one patient with infiltrating carcinoma of the pancreas head. The mean pressure in the pancreatic duct was 22.2 cm H_2O (range 9.6-37.0 cm H_2O). However, in two patients with marked chronic pancreatitis and one with pancreatic carcinoma, the secretion pressure was considerably diminished. The mean pressure values in the duodenum were considerably lower than in the common bile duct or the pancreatic duct and ranged from 0.6 to 10.9 cm H_2O. Different undulation patterns were detected in both ducts including slight undulations (slow pressure changes with constant average pressure) and coarse undulations (rapid fluctuating pressure changes). The significance of the findings for the physiology and pathophysiology of the pancreatic and biliary duct systems and for the possible detection of excretory pancreatic insufficiency or stenosis of the pancreatic duct system are also discussed.

5520 DIAGNOSTIC IMPORTANCE OF CHANGES IN CIRCULATING CONCENTRATIONS OF IMMUNOREACTIVE TRYPSIN. (Eng.) Elias, E.; Redshaw, M.; Wood, T. (Royal Free Hosp., London, England). *Lancet* 2(8028): 66-68; 1977.

A specific and sensitive radioimmunoassay (RIA) was developed that makes possible the determination of serum or plasma trypsin concentrations, despite the presence of trypsin inhibitors, which have invalidated previously available enzymatic techniques. The assay was used in a preliminary series of 187 patients in whom the condition of the pancreas was known. The assay was most precise at about 300 μg trypsin standard Ag5/1 of serum, a value comparable with the mean in 76 healthy volunteers (273 μg/l) and in 20 hospital patients with nonpancreatic disease (266 μg/l). Markedly raised concentrations (970-6,500 μg/l) were found in all 14 patients with acute pancreatitis and in 8 patients with chronic renal failure (580-1,360 μg/l). Abnormal concentrations were found in 11 of 16 patients (69%) with pancreatic cancer (8 high, 3 low) and in 15 of 23 patients (65%) with chronic pancreatitis (3 high, 12 low). The 17 patients with jaundice had normal or marginally lower than normal concentrations, unless pancreatic disease or common duct gallstones were present. Measurement of serum trypsin at an early stage may simplify and shorten the sequence of tests undergone by many patients to obtain a definitive diagnosis in pancreatic disease.

5521 ARTERIOGRAPHY IN THE EVALUATION OF PANCREATIC PSEUDOCYSTS. (Eng.) Levin, D. C.; Eisenberg, H.; Wilson, R. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Am. J. Roentgenol.* 129(2):243-248; 1977.

A policy of limiting preoperative diagnostic imaging of pancreatic pseudocysts to barium studies, sonography, or computer tomography is discussed; this policy will result in failure to detect frequently associated lesions, which may only be appreciated by arteriography and that radically alter both the prognosis and surgical approach. These associated lesions include: pseudoaneurysms, probably the most common cause of major gastrointestinal hemorrhage in pseudocyst patients; pancreatic carcinoma, a possible etiologic factor leading to formation of the pseudocyst; benign or malignant cystadenomas, which mimic pseudocysts clinically, but can be usually identified arteriographically by prominant neovascularity; and splenic vein obstruction, which can produce extrahepatic portal hypertension and necessitate splenectomy. These complicating lesions have been found to be relatively common. Their preoperative detection is desirable and is best accomplished by arteriography. For this reason, arteriography should be routinely performed in patients suspected of pancreatic pseudocyst.

5522 ^{99m}Tc-PYRIDOXYLIDENE GLUTAMATE, A GALL BLADDER IMAGING AGENT: CHEMISTRY OF PREPARATION AND COMPARATIVE ANIMAL STUDIES WITH ^{131}I-ROSE BENGAL. (Eng.) Chiotellis, E.; Subramanian, G.; McAfee, J. G. (N.R.C. "Democritos," Athens, Greece). *Int. J. Nucl. Med. Biol.* 4(1):21-28; 1977.

5523 ASSESSMENT OF ENDOSCOPIC ASPIRATION CYTOLOGY AND ENDOSCOPIC RETROGRADE CHOLANGI-[sic] PANCREATOGRAPHY (ERCP) IN PATIENTS WITH CANCER OF THE PANCREAS: PART I. (Eng.) Harada, H.; Sasaki, T.; Yamamoto, N.; Tanaka, J.; Tomiyama, Y.; Hinofuji, T.; *et al.* (Okayama Univ. Medical Sch., 5-1 Shikadamachi 2-chome, Okayama, 700 Japan). *Gastroenterol. Jpn.* 12(1):52-58; 1977.

5524 ASSESSMENT OF ENDOSCOPIC ASPIRATION CYTOLOGY AND ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY IN PATIENTS WITH CANCER OF THE HEPATO-BILIARY TRACT: PART II. (Eng.) Harada, H.; Sasaki, T.; Yamamoto, N.; Tanaka, J.; Tomiyama, Y.; Hinofuji, T.; *et al.* (Okayama Univ. Medical Sch., 5-1 Shikada 2-chome, Okayama, 700 Japan). *Gastroenterol. Jpn.* 12(1):59-64; 1977.

5525 TECHNETIUM-99m BILIARY SCANNING AGENTS BASED ON PYRIDOXAL: EFFECT OF THE AMINO ACID COMPONENT ON LABELLING AND BIOLOGICAL DISTRIBUTION. (Eng.) Baker, R. J.; Bellen, J. C. (Inst. Medical & Veterinary Science, Frome Rd., Adelaide, South Australia). *Int. J. Nucl. Med. Biol.* 4(1): 85-91; 1977.

5526 COLONOSCOPY IN CLINICAL PRACTICE. (Eng.) Knoepp, L. F., Jr. (Wallace Wilson Brailsford Clinic, P.A., PO Box 2768, Spartanburg, SC 29304). *South. Med. J.* 70(5):526-530; 1977.

5527 A NEW TECHNIQUE FOR INSERTION OF THE COLONOSCOPE THROUGH THE ILEOCAECAL VALVE. (Eng.) Gabrielsson, N.; Granqvist, S. (Huddinge Univ. Hosp., S-14186 Huddinge, Sweden). *Endoscopy* 9(1):38-41; 1977.

5528 CLINICAL EVALUATION OF A SONDE-TYPE SMALL INTESTINAL FIBERSCOPE. (Eng.) Tada, M.; Akasaka, Y.; Misaki, F.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kyoto, Japan). *Endoscopy* 9(1):33-38; 1977.

5529 SERUM AMYLASE FOLLOWING ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERP). (Eng.) Caletti, G. C.; Di Febo, G.; Bolondi, L.; Tomesani A.; Ventrucci, M.; Vandelli, A.; Fontana, G. (Policlinico S. Orsola, 40138 Bologna, Italy). *Rend. Gastroenterol.* 9(1):24-27; 1977.

5530 EMERGENCY UPPER GASTROINTESTINAL ENDOSCO
DOES HASTE MAKE WASTE? (Eng.) Winans,
S. (Univ. Chicago, Pritzker Sch. Medicine, Chicago
IL 60637). *Am. J. Dig. Dis.* 22(6):536-540; 1977.

5531 RADIONUCLIDE AND ULTRASONIC ASSESSMENT O
UPPER ABDOMINAL MASSES IN CHILDREN. (En
Gates, G. F.; Miller, J. H. (Children's Hosp. of L
Angeles, 4650 Sunset Blvd., Los Angeles, CA 90027)
Am. J. Roentgenol. 128(5):773-780; 1977.

5532 APPLICATION OF INTRAGASTRIC pH-METRY FOR
DIAGNOSTIC AND THERAPEUTIC CONTROL OF GA
TRIC DISEASES. (Eng.) Abasov, I. T.; Iof, I. M. (Gabdulla Tukaya St., Bl.26, Flat 28, 370033 Baku, USSR). *Am. J. Gastroenterol.* 67(3):229-234; 1977.

5533 DIAGNOSIS OF A BLEEDING MECKEL'S DIVERTI
LUM USING RADIOPERTECHNETATE. (Eng.) S
tzer, M. H.; Conte, P. J., Jr.; Rickert, R. R.; Si
er, M. (New Jersey Coll. Medicine Dentistry, 201 S
Livingston Ave., Livingston, NJ 07039). *Am. J. Gastroenterol.* 67(3):235-239; 1977.

5534 MINILAPAROTOMY AS AN AID TO DIAGNOSING LIVER DISEASE. (Eng.) Stein, H. D.; Saalfrank, V.; Meng, C. H. (Albert Einstein Coll. Medicine, New York, NY). *Surg. Gynecol. Obstet.* 145(1):49-54; 1977.

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an Medical Center, 622 W. 168th St., New York, NY
0032). *Radiology* 124(2):297-305; 1977.

537 SCINTIGRAPHIC DIAGNOSIS OF ISCHEMIC INTESTINE WITH TECHNETIUM-99m SULFUR COLLOID-
ABELED LEUKOCYTES. (Eng.) Bardfeld, P. A.; Boley,
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osp. and Medical Center, 111 E. 210th St., Bronx,
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edical Coll. Wisconsin, 8700 W. Wisconsin Ave.,
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inic, 9500 Euclid Ave., Cleveland, OH 44106).
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ssell, E.; LePage, J.; Meier, W. L. (Jackson
morial Hosp., Miami, FL 33140). *Radiology*
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TRAVENOUS CHOLANGIOGRAPHY. (Eng.) Moss, A. A.
niv. California Sch. Medicine, San Francisco
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; Perri, G. (Red Cross War Memorial Children's Hosp., Cape Town, South Africa). *Clin. Radiol.* 28(4):465-468; 1977.

5545 DIAGNOSTIC LAPAROTOMY. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6080):144-145; 1977.

5546 THE PORTAL VENOUS TREE SIMULATING DILATED BILIARY DUCTS ON COMPUTED TOMOGRAPHY OF THE LIVER. (Eng.) Kressel, H. Y.; Korobkin, M.; Goldberg, H. I.; Moss, A. A. (Univ. California Sch. Medicine, San Francsico, CA 94143). *J. Comput. Assist. Tomogr.* 1(2):169-175; 1977.

5547 THE EFFECT OF TIN ON THE TISSUE DISTRIBUTION OF ^{99m}Tc-SODIUM PERTECHNETATE. (Eng.) Ancri, D.; Lonchampt, M. F.; Basset, J. Y. (Hopital de la Pitie, 83, bld. de l'Hopital, 75634 Paris Cedex 13, France). *Radiology* 124(2):445-450; 1977.

5548 SERUM LYSOZYME LEVELS IN INFLAMMATORY BOWEL DISEASE. (Eng.) Manier, J. W.; Roberts, R. C.; Zais, D. P. (Marshfield Medical Foundation, 510 N. St. Joseph Ave., Marshfield, WI 54449). *Am. J. Gastroenterol.* 67(3):245-248; 1977.

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5551 PERORAL DIRECT CHOLANGIOSCOPY (PDCS) USING ROUTINE STRAIGHT-VIEW ENDOSCOPE: FIRST REPORT. (Eng.) Urakami, Y.; Seifert, E.; Butke, H. (Reinhard-Nieter-Krankenhaus, D-2940 Wilhelmshaven, W. Germany). *Endoscopy* 9(1):27-30; 1977.

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5553 GLUTARALDEHYDE FIXATION FOR ELECTRON MICROSCOPY OF NEEDLE BIOPSIES FROM HUMAN LIVERS. (Eng.) Petersen, P. (Rigshospitalet, Blegdamsvej 9, DK-2100, Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(3):373-383; 1977.

5554 WHY DO Tc-99m CHELATES WORK FOR CHOLESCINTIGRAPHY? (Eng.) Firnau, G. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *Eur. J. Nucl. Med.* 1(3):137-139; 1976.

5555 THE EMERGENCY ENDOSCOPY CONTROVERSY: JOHN F. MORRISSEY VS CHARLES S. WINANS. EARLY ENDOSCOPY FOR MAJOR GASTROINTESTINAL BLEEDING--IT SHOULD BE DONE. (Eng.) Ginsberg, A. L.; Morrissey, J. F. (Univ. Hosp., 1300 University Ave., Madison, WI 53706). *Am. J. Dig. Dis.* 22(6):534-535; 1977.

5556 NONINVASIVE DIAGNOSIS OF SUCROSE INTOLERANCE IN CHILDHOOD BY INTERVAL BREATH HYDROGEN DETERMINATION [Abstract]. (Eng.) Perman, J. A.; Barr, R. G.; Watkins, J. B. *In: The American Pediatric Society and The Society for Pediatric Research Combined Program and Abstracts.* (San Francisco, CA): p. 448; 1977.

See also, 5276, 5390, 5503, 5557, 5558, 5561, 5565, 5580, 5583, 5587, 5588, 5590, 5601, 5602, 5607, 5617, 5621, 5622, 5627, 5640, 5643, 5649, 5667, 5670, 5680, 5687, 5690, 5708, 5713, 5714, 5715, 5717, 5731, 5744, 5745, 5747, 5749, 5751, 5752, 5761, 5771, 5772, 5773, 5774, 5778, 5779, 5790, 5795, 5799, 5800, 5801, 5802, 5809, 5810, 5811, 5830 5831, 5836, 5838, 5881, 5891, 5910, 5911 5913, 5915, 5924, 5925, 5926, 5938, 5941 5974, 5983.

GASTROINTESTINAL DISEASES

ESOPHAGUS

557 VALUE AND LIMITATIONS OF THE DETERMINATION OF CARCINOEMBRYONIC ANTIGEN (CEA) N PATIENTS WITH ESOPHAGEAL AND GASTRIC CANCER. Fre.) Chatal, J. F.; Dedieu, P. R.; Lemevel, B. .; Helary, J.; Guihard, D.; Salard, J. L. (Centre ene Gauducheau, 44 Nantes, France). *Bull. Cancer Paris)* 63(4):531-540; 1976.

study was made of the carcinoembryonic antigen (CEA) n 58 patients with histologically diagnosed cancer f the esophagus and 32 patients with cancer of the tomach. A value of 10 ng/ml of serum was selected s the upper limit for CEA levels after evaluations n 127 normal patients. Of the 58 esophageal cancer atients, 40% had CEA levels between 10-20 ng/ml. nly 8.6% had CEA values greater than 20 ng/ml and nly one value was higher than 50 ng/ml. Fifty-hree percent of stomach cancer patients had CEA evels greater than 10 ng/ml. Of these, 23% were reater than 20 ng/ml and 19% were greater than 50 g/ml. CEA values appear to be higher in cases of tomach cancer than esophageal cancer. Values reater than 50 ng/ml in either disease are most ikely to be indicative of metastasis. There appears o be a correlation among CEA titers and location, ge, and histological appearance of the tumors. CEA easurements may be of value in distinguishing be-ween local recurrence and metastasis in certain ypes of cancer.

558· RADIOLOGIC MANIFESTATIONS OF ESOPHAGEAL LYMPHOMA. (Eng.) Carnovale, R. L.; oldstein, H. M.; Zornova, J.; Dodd, G. D. (Hermann osp., Houston, TX 77030). *Am. J. Roentgenol.* 28(5):751-754; 1977.

he cases of eight patients with esophageal lymphoma re summarized, and the spectrum of radiologic ppearances is presented. The series included five en and three women ranging in age from 30 to 71 yr. our patients had histiocytic lymphoma, two had ymphocytic lymphoma, one each had undifferentiated ymphoma and Hodgkin's disease. Four had dysphagia, hile the remaining patients had no symptoms refer-ble to the esophagus. All patients had gastro-ntestinal involvement, and the stomach was affected n all cases. The most common radiologic appearance 5 cases) was involvement of the distal portion of he esophagus in association with contiguous nvolvement of the gastric fundus; this was accom-anied by nodularity and nonobstructive narrowing f the distal esophagus. Other appearances were an lcerated mass in the proximal third of the thoracic sophagus, multiple submucosal nodules throughout he lower two-thirds of the thoracic esophagus occurring in the only patient without involvement f the gastroesophageal junction), and a pattern imulating esophageal varices. The radiologic eatures in these patients are similar to those ccurring elsewhere in the gastrointestinal tract.

5559 THE RELATIONSHIP BETWEEN SERUM IRG LEVELS AND LES PRESSURE UNDER VARIOUS CONDITIONS. (Eng.) Siewert, R.; Weiser, H. F.; Lepsien, G.; Jennewein, H. M.; Waldeck, F.; Arnold, R.; *et al.* (Oberarzt der Universitats-Klinik fur Allgemeinchirurgie, Gosslerstrasse 10, D-3400 Gottingen, W. Germany). *Digestion* 15(3):162-174; 1977.

To investigate whether there is any correlation between fasting gastrin level and resting pressure of the lower esophageal sphincter (LES), both values were measured in five groups of patients: (1) 15 patients with manometrically verified gastro-esophageal reflux with pentagastrin-stimulative LES and 15 patients with nonstimulative LES, (2) 20 patients with manometrically and radiologically verified achalasia, (3) 20 patients with hypogastrinemia (fasting gastrin level, 18 pg/ml), (4) 10 patients with hypergastrinemia (fasting gastrin level, 150 pg/ml), and (5) a control group of 20 healthy volunteers. No correlation between fasting immunologically-reacting gastrin (IRG) levels and LES resting pressures could be made in subjects with an undisturbed LES (20 in control group, 15 reflux patients with pentagastrin stimulative LES, and 20 patients with hypogastrinemia). After food ingestion, a short phase of LES pressure increase (from 13.5 ± 1.5 to 21.7 ± 3.8 mm Hg) was observed during the increasing phase of gastrin level, but no correlation was reported in individual control subjects. In groups of patients with LES insufficiency and reflux esophagitis, the LES pressures were lower (7.8 ± 1.4 mm Hg) than those of the control group (13.5 ± 1.5 mm Hg), while the fasting serum IRG levels were normal (34.8 ± 16.6 pg/ml). In six patients with hypergastrinemia, the fasting IRG levels (171.8 ± 38.4 pg/ml) were significantly ($p<0.005$) above those of the control group, but LES pressures were not different. No clear connection in humans between serum gastrin and LES function was shown.

5560 BACTERAEMIA FOLLOWING OESOPHAGEAL DILATATION AND OESOPHAGO-GASTROSCOPY. (Eng.) Stephenson, P. M.; Dorrington, L.; Harris, O. D.; Rao, A. (Princess Alexandra Hosp., Woolloongabba, Brisbane, Queensland 4102, Australia). *Aust. N.Z. J. Med.* 7(1):32-35; 1977.

The potential problem of bacteremia after esophageal dilatation or upper gastrointestinal fiberendoscopy was investigated. Blood cultures were taken immediately prior to the procedure and at 5 and 30 min following the procedure. Swab cultures of the endoscopes and the bougies taken prior to the procedures grew no organisms. Of 11 patients with esophageal stricture or spasm who underwent esophageal dilatation with Hurst's bougies, 5 had significant but asymptomatic streptococcal bacteremia at 5 min, and in 3 of these, the bacteremia persisted 30 min. In an additional patient, *Staph-*

ylococcus albus resistant to penicillin and ampicillin was cultured at 30 min. In two patients with streptococcal bacteremia, identical bacteria were cultured from swabs taken from the bougie after the procedure. No bacteremia was identified in 10 volunteers without esophageal pathology, who underwent passage of the same dilators. After esophagogastroscopy, *Streptococcus viridans* was identified in 1 of 10 patients; this patient underwent gastroscopy because of a duodenal ulcer. Apart from the *Staphylococcus albus* in one of the patients who underwent esophageal dilatation, all organisms cultured were sensitive *in vitro* to penicillin, ampicillin, and cephalosporins. Any of these antibiotics are considered to be suitable for prophylactic use prior to performing esophageal dilatation and upper gastrointestinal endoscopy in "at risk" patients. The risk of bacteremia appears to be much lower after endoscopy than after esophageal dilatation for stricture or esophageal spasm. It is concluded that mucosal trauma is the site of entry of pharyngeal commensals leading to bacteremia.

5561 THE COLUMNAR-LINED ESOPHAGUS--ANALYSIS OF 26 CASES. (Eng.) Robbins, A. H.; Hermos, J. A.; Schimmel, E. M.; Friedlander, D. M.; Messian, R. A. (Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *Radiology* 123(1):1-7; 1977.

Clinical and radiographic findings are reported in 26 patients with specialized columnar epithelium in the esophagus (Barrett's esophagus). Dysphagia (21 patients) and heartburn and/or regurgitation (20 patients) were the most common clinical features in these patients. Sixteen of 26 patients had radiological evidence of reflux, and 16 of 17 patients had manometrically documented incompetent lower esophageal sphincters. A total of 22 patients had either demonstrable gastroesophageal reflux by oral barium study and/or lower esophageal sphincter pressures below 10-12 mm Hg. Hiatal hernia, stricture in the middle or lower esophagus, ulcers, and minor mucosal abnormalities were found to be variably located. Mucosal irregularity, nodularity, or thickening, indicating superficial ulceration, was reported in 19 patients. It is suggested that Barrett's esophagus is a developmental change that usually occurs consequent to gastroesophageal reflux, with replacement of squamous epithelium by columnar epithelium (without parietal cells), and may be premalignant in nature.

5562 INTRATHORACIC VOLVULUS OF THE STOMACH IN HIATUS HERNIA. REPORT OF SIX CASES. (Fre.) Doutre, L. P.; Perissat, J.; Gouffrant, J. M.; Bobois, J. P.; Grenet, J. (Clinique Chirurgicale A, C.H.U., 311, boulevard du President Wilson, 33200 Bordeaux, France). *Ann. Chir.* 31(6):511-514; 1977.

Intrathoracic volvulus of the stomach was successfully corrected in five of six patients with hiatal hernias. In the first three stages of volvulus (ascension, incarceration, and reducible obstructio the problem was easily approached abdominally. Irreducible obstructions and strangulations necessitated a thoracotomy, which led to a high mortalit (1/2 cases). Preventive surgery is recommended whenever the volvulus reaches the stage of incarceration, even in high risk patients.

5563 PREGNANCY HEARTBURN IN NIGERIANS AND CAUCASIANS WITH THEORIES ABOUT AETIOLOGY BASED ON MANOMETRIC RECORDINGS FROM THE OESOPHAGUS AND STOMACH. (Eng.) Bassey, O. O. (Coll. Medicine Univ. Lagos, P.M.B. 12003, Lagos, Nigeria). *Br. J. Obstet. Gynaecol.* 84(6):439-443; 1977.

The incidence of heartburn during pregnancy in Nigerians was compared with that of Caucasians, and the etiology of heartburn was studied by determining the lower esophageal sphincter pressure in pregnant and nonpregnant women. A study by questio naire of the incidence of pregnancy heartburn in two groups of Nigerians and one group of Caucasian showed an incidence of 9.8% in all Nigerians and 78.8% in Caucasians. The difference was highly significant ($\chi^2=102.75$, $p<0.0001$). An esophageal manometric study of the lower esophageal sphincter in 12 nonpregnant women and in 12 pregnant Nigeria (10 without heartburn and 2 with heartburn) showed that the mean lower esophageal sphincter pressure in the pregnant patients without heartburn was 20.1 ± 7.0 mm Hg and 17.9 ± 7.0 mm Hg in the nonpregnant women. While one pregnant subject withou heartburn had a lower esophageal sphincter, which was partially displaced into the thorax, none of the nonpregnant women had such sphincter displacement. The two pregnant women with heartburn had low resting sphincter pressures, and in both of them, the sphincters were partially in the thorax. It is concluded that pregnancy heartburn is due to the displacement of the lower esophageal sphincter into the negative pressure environment of the thor where the sphincter is less capable of resisting reflux. Pregnancy heartburn is commoner in Caucasians than in Nigerians because the sphincter in nonpregnant Caucasians is often partly intrathora and is more easily displaced completely into the thorax by the pregnant uterus.

5564 CHILDHOOD GASTROESOPHAGEAL REFLUX: NEUROLOGIC AND PSYCHIATRIC SYNDROMES MIMIC (Eng.) Bray, P. F.; Herbst, J. J.; Johnson, D. G Book, L. S.; Ziter, F. A.; Condon, V. R. (Univ. Utah Coll. Medicine, 50 N. Medical Dr., Salt Lake City, UT 84132). *JAMA* 237(13):1342-1345; 1977.

The cases of 13 infants and children (aged 2 mont to 3.5 yr) with proven gastroesophageal reflux (G in whom the initial clinical features suggested a neurologic or psychiatric disorder are presented. Signs of dystonia, especially abnormalities in th posture of the head and neck, were present in 11 patients, irritability in 10, developmental retar ation in 10, and dysphagia in 9. In six infants the occurrence of apparent seizures reinforced th concern that the other symptoms had a primary neurologic basis, leading to the institution of anticonvulsant therapy in four cases. The authors believe that the seizures in all cases represented episodes of reflux, aspiration, and laryngospasm, usually associated with apnea, cyanosis, and stiffening. This sequence may have been responsible for the death of one infant. Pulmonary infiltrates were demonstrated one or more times in 8 of the 13 cases. Three patients were referred to psychiatrists at 3 to 5 yr of age, when explanations for their torticollis, abdominal pain, and irritability could not be found. Symptoms began in early infancy in 10 cases, but accurate diagnosis and proper treatment were not instituted in three patients until 3 to 5 yr of age. The diagnosis of GE reflux, with hiatal hernia in five cases, was made in all cases. Most patients responded to appropriate medical or surgical treatment. The authors believe that the diagnosis of symptomatic GE reflux is often overlooked. The consequences of missed diagnosis or improper treatment are potentially lethal.

5565 CORRELATION BETWEEN MANOMETRIC AND pH TESTS FOR GASTRO-OESOPHAGEAL REFLUX.

Eng.) Stanciu, C.; Hoare, R. C.; Bennett, J. R. Hull Royal Infirmary, Kinston upon Hull, England). *ut* 18(7):536-540; 1977.

o determine which of several diagnostic tests best atches the clinical diagnosis of gastroesophageal eflux, gastroesophageal sphincter pressure measure- ent, short-term pH tests, and 15-hr overnight sophageal pH recording were carried out in 42 ormal subjects and 214 patients with typical reflux ymptoms. The results were compared by multivariate iscriminant analysis. Sphincter pressure measure- ents misclassified 32%, while stressed provocative aneuvers misclassified 14.5%; the best single iscriminator from the overnight pH study was time elow pH 5, which misclassified 13%. However, a ombination of the number of reflux episodes in 15 r with their mean duration reduced misclassifica- ion to 8.8%. Using this function, a boundary etween normal and reflux can be drawn, and the egree of abnormality can be expressed visually as ell as numerically.

566 RHEUMATOID ESOPHAGEAL DISEASE. (Eng.)

Nishikai, M.; Asaba, G.; Homma, M. Dept. Medicine, State Univ. New York at Buffalo, 495 Bailey Ave., Buffalo, NY 14215). *Am. J. astroenterol.* 67(1):29-33; 1977.

e existence of esophageal dilatation in rheumatoid thritis (RA) is reported. Standard posteroanter- r esophagrams were performed in 43 RA patients d in 43 healthy subjects matched with the patients sex and age. The incidence of esophageal dila- ation (esophageal diameter exceeding 30 mm) in RA tients (28%) was significantly higher ($p<0.001$) an that in healthy subjects (0%). The mean esoph- eal diameter in the RA patients was 26.5 ± 14.1 compared with 22.0 ± 8.3 mm for healthy subjects. higher incidence of esophageal dilatation was served in patients with pulmonary fibrosis and patients with s.c. nodules ($p<0.01$, $p<0.05$, resp.). The incidence of esophageal dilatation in 3 patients with pulmonary fibrosis was 100% compared with 23% for 40 patients without pulmonary fibrosis. Among 9 patients with s.c. nodules, the incidence of esophageal dilatation was 56% compared with 21% for 34 patients without s.c. nodules. Unexpected orderly correlations (not specified) were observed between the incidence of esophageal dilatation and grades of RA tests, stage of joint X-ray, or duration of disease. The incidence of esophageal dilatation among 6 rheumatoid patients with a negative RA test was 0% compared with incidences ranging from 22 to 33% for 37 patients with positive RA tests. The incidences of esophageal dilatation among 3 stage I disease patients, 9 stage II patients, 20 stage III patients, and 10 stage IV patients were 0, 22, 30, and 40%, resp. When the duration of the disease was less than 1 yr, the incidence of esophageal dilatation was 14% compared with 20% for disease durations of 1-5 yr and 32% for rheumatoid disease with a duration of more than 5 yr. The findings suggest the existence of "rheumatoid esophageal disease."

5567 SYMPTOMATIC DIFFUSE ESOPHAGEAL SPASM: MANOMETRIC FOLLOW-UP AND RESPONSE TO CHOLINERGIC STIMULATION AND CHOLINESTERASE INHIBITION.

(Eng.) Mellow, M. (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Gastroenterology* 73(2):236-240; 1977.

The stability of manometric findings in symptomatic diffuse esophageal spasm (SDES) over time and the response of the body of the esophagus in SDES to both a direct cholinergic agonist and a cholinesterase inhibitor were examined in five patients and eight controls. The criteria for SDES included: (1) history of spontaneous postprandial substernal chest pain, (2) dysphagia, (3) radiological diagnosis of diffuse esophageal spasm, (4) esophageal manometry in which at least 30% of responses to swallowing were abnormal, showing repetitive and/or simultaneous contractions having increased mean amplitude (>35 mm Hg) and a mean duration of over 7.5 sec, and (5) presence of some peristaltic responses. All five patients had undergone motility studies 1-13 (mean, 8) months previously; the manometric abnormalities remained unchanged at the follow-up evaluation. The mean lower esophageal sphincter pressure was unchanged (24.4-25.4 mm Hg). The mean duration of esophageal contractions in the distal esophagus was 8.5 ± 0.5, 6.2 ± 0.3, and 5.3 ± 0.3 sec in SDES, eight controls, and eight controls with heartburn, resp. The response to edrophonium chloride (100 µg/kg, i.v.) in SDES (14.4 ± 2.3 sec) was significantly greater than that in controls (3.9 ± 0.7 sec, $p<0.001$) or in controls with heartburn (2.4 ± 0.4 sec, $p<0.001$). The response to bethanechol (40 µg/kg, s.c.) in SDES (12.5 ± 4.8 sec) was significantly greater than that in controls (0.8 ± 0.4, $p<0.02$) or in patients with heartburn (0.4 ± 0.2, $p<0.01$). Chest pain occurred in six of eight patients with SDES after edrophonium and in three of six patients after bethanechol; chest pain did not occur in the other subjects. The results suggest that SDES is a relatively homogeneous entity, with respect to both maintaining stability of manometric abnormalities and response to two different pharmacological agents.

5568 TRANSHEPATIC OBLITERATION OF GASTROESOPHAGEAL VARICES: RESULTS IN ACUTE AND NONACUTE BLEEDERS. (Eng.) Viamonte, M., Jr.; Pereiras, R.; Russell, E.; Le Page, J.; Hutson, D. (Univ. Miami Sch. Medicine and Affiliated Hosp.,, P.O. Box 520875, Miami, FL 33152). *Am. J. Roentgenol.* 129(2):237-241; 1977.

Transhepatic portal vein catheterization and variceal obliteration were carried out in 73 patients with liver cirrhosis and bleeding gastroesophageal varices. Gastroesophageal varices were successfully obliterated in 32 actively bleeding patients and in 35 patients with stabilized bleeding gastroesophageal varices. The remaining six procedures were technical failures. Follow-up examinations in 10 patients from 1 month to 3 yr later showed persistent obliteration of embolized veins. Recurrence of variceal bleeding occurred in nine patients. This method should be considered as a palliative, effective adjuvant to the medical treatment of patients with bleeding gastroesophageal varices.

5569 MANOMETRIC ASYMMETRY OF THE LOWER-ESOPHAGEAL HIGH-PRESSURE ZONE. (Eng.) Winans, C. S. (Box 400, Univ. Chicago Hosp. and Clinics, 950 E. 59 St., Chicago, IL 60637). *Am. J. Dig. Dis.* 22(4):348-354; 1977.

5570 SURGICAL MANAGEMENT OF ESOPHAGEAL STRICTURE DUE TO RECESSIVE DYSTROPHIC EPIDERMOLYSIS BULLOSA. (Eng.) Fonkalsrud, E. W.; Ament, M. E. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *J. Pediatr. Surg.* 12(2): 221-226; 1977.

5571 DIAGNOSIS AND TREATMENT OF HEMORRHAGE IN PATIENTS WITH HIATAL HERNIA. (Eng.) Deveney, C. W.; Thomas, A. N. (Dept. Surgery, Univ. California, 1001 Potrero Ave., San Francisco, CA 94110). *J. Thorac. Cardiovasc. Surg.* 73(4):497-503; 1977.

5572 NISSEN FUNDOPLICATION FOR REFLUX PEPTIC ESOPHAGITIS. (Eng.) Bushkin, F. L.; Neustein, C. L.; Parker, T. H.; Woodward, E. R. (Coll. Medicine, Univ. Florida, Gainesville, FL). *Ann. Surg.* 185(6):672-677; 1977.

5573 CARCINOMA OF THE CARDIA AND THORACIC OESOPHAGUS COEXISTING WITH AND FOLLOWING SLIDING HIATAL HERNIA AND PEPTIC STRICTURE. (Eng.) Moghissi, K. (Castle Hill Hosp., Castle Rd., Cottingham, N. Humberside HU16 5JQ, England). *Thorax* 32(3): 342-345; 1977.

5574 A STUDY OF FUNDOPLICATION DISRUPTION AND
DEFORMITY. (Eng.) Saik, R. P.; Greenbur
A. G.; Peskin, G. W. (Veterans Admin. Hosp., 3350
LaJolla Village Drive, San Diego, CA 92161). *Am. J.*
Surg. 134(1):19-24; 1977.

5575 CARCINOMA OF THE GASTROESOPHAGEAL JUNCTIO
A TEN YEAR EXPERIENCE WITH ESOPHAGOGASTRE
TOMY. (Eng.) Stone, R.; Rangel, D. M.; Gordon, H.
E.; Wilson, S. E. (Veterans Admin. Wadsworth Hosp.
Center, Los Angeles, CA 90073). *Am. J. Surg.* 134(1
70-76; 1977.

5576 OESOPHAGEAL TRAUMA: INCIDENCE, DIAGNOSIS
AND MANAGEMENT. (Eng.) Triggiani, E.;
Belsey, R. (2nd Faculty Medicine, Surgery, Univ.
Naples, Cappella Cangiani, Naples, Italy). *Thorax*
32(3):241-249; 1977.

5577 INCIDENCE OF HIATUS HERNIA AND GASTRO-OESOPHAGEAL REFLUX IN 1030 PROSPECTIVE
BARIUM MEAL EXAMINATIONS IN ADULT NIGERIANS. (Eng.
Bassey, O. O.; Eyo, E. E.; Akinhanmi, G. A. (Coll.
Medicine, Univ. Lagos, PMB, 12003, Lago, Nigeria).
Thorax 32(3):356-359; 1977.

5578 DOWNHILL VARICES: REPORT OF A CASE 29
YEARS AFTER RESECTION OF A SUBSTERNAL TH
ROID GLAND. (Eng.) Sorokin, J. J.; Levine, S. M.
Moss, E. G.; Biddle, C. M. (1210 Brace Rd., Cherry
Hill, NJ 08034). *Gastroenterology* 73(2):345-348;
1977.

5579 ADVANTAGE OF INTRAARTERIAL OVER INTRAVEN
VASOPRESSIN INFUSION IN GASTROINTESTINAL
HEMORRHAGE. (Eng.) Davis, G. B.; Bookstein, J. J
Coel, M. N. (Univ. California Medical Center, 225
Dickinson St., San Diego, CA 92103). *Am. J. Roent*
nol. 128(5):733-735; 1977.

5580 THE ROENTGENOGRAPHIC DEMONSTRATION OF A
GASTRIC MUCOSAL LACERATION (MALLORY-WEIS
LESION). (Eng.) Meyers, S.; Conard, F. U. (Walso
Army Hosp., Fort Dix, NJ 08640). *Am. J. Gastroenterol.* 67(3):281-284; 1977.

5581 HIATAL HERNIA--MANOMETRIC AND SYMPTOMATI
ASSESSMENT OF FAILED SURGICAL MANAGEMENT
60 PATIENTS. (Eng.) Bremner, C. G. (Dept. Surger
Univ. Witwatersrand, Johannesburg, South Africa).
S. Afr. Med. J. 51(25):924-925; 1977.

5582 THE RELATIONSHIP BETWEEN INTRAGASTRIC A
LOWER ESOPHAGEAL SPHINCTER PRESSURES DU
GENERAL ANESTHESIA. (Eng.) Kim, K. C.; Patdu, R.
Kim, H. W. (Indiana Univ. Sch. Medicine, 1100 W.
Michigan St., Indianapolis, IN 46202). *Anesthesi*
gy 46(6):424-426; 1977.

5583 NEGATIVE BARIUM MEAL FINDINGS IN UPPER GASTROINTESTINAL HAEMORRHAGE. (Eng.)
cCredie, J. (Dept. Surgery, Univ. Sydney, New South
ales 2006, Australia). *Med. J. Aust.* 1(11):379-
80; 1977.

584 THE STENOSIS OF THE TERMINAL ESOPHAGUS AFTER SURGICAL REPAIR OF THE HIATUS HERNIA.
Eng.) D'Amico, D. F.; Favia, G.; Zacchi, C.; Bassi,
.; Tropea, A. (Dept. General Surgery, Univ. Padua,
ia Giustiniani, I-35100, Padua, Italy). *Acta Chir.*
elg. 76(3):219-224; 1977.

585 IATROGENIC PERFORATION OF THE ESOPHAGUS.
(Eng.) Ancona, E.; Semenzato, M.; Perac-
nia, A. (Istituto di semeiotica chirurgica, Univer-
ita di Padova, Via Gattamelata 64, I-35100 Padova,
aly). *Acta Chir. Belg.* 76(3):211-218; 1977.

5586 THE ADVANCING FRONTIERS OF OESOPHAGEAL SURGERY. (Eng.) Franklin, R. H. (Hammersmith Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 59(4):284-287; 1977.

See also, 5530, 5555, 5599, 5644, 5756, 5902, 5939, 5985.

STOMACH

87 TOUCH SMEAR CYTOLOGY FOR ENDOSCOPIC DIAGNOSIS OF GASTRIC CARCINOMA. (Eng.) Tam-
a, K.; Masuzawa, M.; Akiyama, T.; Fukui, O. (Natl.
aka Hosp., Hoenzaka, Higashi-Ku, Osaka, Japan).
. *J. Gastroenterol.* 67(5):463-467; 1977.

e accuracy of histology and touch smear cytology
specimens obtained by endoscopic target biopsy
s studied retrospectively. Sixty-five cases of
all excavated-type gastric carcinoma, in-
uding 27 cases of early carcinoma, were examined.
histology alone, 89% of cases were diagnosed ac-
rately, 85% by touch smear cytology alone and
% by combined examination. By touch smear cy-
logy, 10 of 16 specimens were diagnosed as posi-
ve, although extensive necrosis prevented his-
logic study. This study demonstrates that the
oor, as well as the edge and margin, of the exca-
ted lesion is an important target site for biopsy.
uch smear cytologic techniques aid in the diag-
sis of gastric malignancy.

8 RADIOIMMUNOASSAY OF CARCINOEMBRYONIC ANTIGEN IN GASTRIC CARCINOMA. (Fre.) Dedieu,
Chatal, J. F.; Gibon, M.; Gaillard, F.; Leduc,
L.; Perrin, D.; Miniconi, P. (Clinique Medicale
pedeutique, Hopital Saint-Jacques, Hotel-Dieu,
.R., Nantes, France). *Gastroenterol. Clin. Biol.*
):415-424; 1977.

um levels of carcinoembryonic antigen (CEA) were
sured in 66 patients with gastric carcinoma,
patients with other digestive tract carcinomas,
patients with nonmalignant gastric diseases,
85 normal controls. Normal values were less
n 10 ng/ml; they were found in 38% of the pa-
nts with benign disease and in 31% of cancer
ients. Elevated values were almost always less
than 50 ng/ml in benign stomach diseases. CEA levels averaged 62 ng/ml in patients with highly differentiated carcinomas, with values greater than 50 ng/ml always being associated with lymphatic invasions and metastases. In undifferentiated carcinomas, CEA levels averaged 30 ng/ml. Normal CEA levels after gastrectomy were not necessarily indicative of complete removal of cancerous tissues, but when CEA values rose after surgery, they were always associated with incomplete resections or further metastases. CEA levels, therefore, may be valuable in the early detection of tumor recurrences.

5589 HLA ANTIGENS AND Ia ANTIBODY IN THE GASTRIC CANCER PATIENT. (Eng.) Tsuji, K.; Ito, M.; Inouye, H.; Nose, Y.; Hoshino, K.; Shibuya, K.; *et al.* (Tokai Univ. Sch. Medicine, Bohseidai, Isehara, Kanagawa 259-11, Japan). *Prog. Clin. Biol. Res.* 16:29-37; 1977.

The possible association of 18 histocompatibility antigen (HLA) specificities in HLA-A locus and 23 specificities in HLA-B locus with susceptibility to gastric cancer was investigated in 87 patients and 355 controls. Significantly decreased antigen, HLA-B5 (17.2%), was found in gastric cancer patients, compared with 40.0% in controls. χ^2 For this antigen difference is 15.8 (corrected $p<0.005$). The most frequent HLA haplotype was A9-B5 in controls and A2-Blank B locus antigen in gastric cancer patients. No reaction was found in HLA antiserum, Bou-Pri with cells of gastric cancer patients, compared with 29.4% in control subjects. No linkage was observed between HLA-A and -B locus antigens and gastric cancer in a family study with double the frequency of HLA haplotype A2-BW40. Ia-like B cell specific antibody was found in 2 of 20 gastric cancer patients in a preliminary study. There was no clear association between B cell specific antibody and clinical implications.

5590 GASTRIC LYMPHOMA, A RADIOLOGIC DIAGNOSIS.

(Eng.) Menuck, L. S. (Univ. Hosp., Univ. California at San Diego, La Jolla, CA). *Gastrointest. Radiol.* 1(2):157-161; 1976.

Thirty cases of gastric lymphoma (reticulum cell sarcoma, 14; lymphosarcoma, 11; Hodgkin's disease, 15) were compared with 50 cases of gastric carcinoma to see if there are radiologic features that are significant and easily applicable in the separation of the two entities. Gastric lymphoma presents as a much larger lesion (average size 11.9 cm) than gastric carcinoma (average size 5.6 cm). Forty percent of the gastric lymphomas and only 4% of the gastric carcinomas were over 15 cm in length. Multiple radiographic patterns are common in gastric lymphoma, being seen in 72% compared to 24% of gastric carcinomas. The most frequent primary radiographic finding in gastric lymphoma (in 56% of patients) was a circumferential, concentric infiltrating pattern consisting of enlarged bizarre rugal folds and submucosal nodularity without significant narrowing of the gastric lumen. A solitary lesion, with or without ulceration, was the most common finding in gastric carcinoma (66% of the cases). Hodgkin's disease was reported to be an exception to other lymphomas in that the presenting lesion was comparable in size and radiographic appearance to gastric carcinoma. Radiographic evaluation is still the most reliable means of diagnosing gastric lymphoma preoperatively. By use of this technique, gastric lymphoma can be distinguished from gastric carcinoma in most cases.

5591 FACTORS IN THE PROGNOSIS OF GASTRIC LYMPHOMA.

(Eng.) Lim, F. E.; Hartman, A. S.; Tan, E. G. C.; Cady, B.; Meissner, W. A. (Milford Chest Hosp., Godalming, Surrey, England). *Cancer* 39(4):1715-1720; 1977.

The tumor-nodes-metastases (TNM) staging classification for gastric carcinoma was applied to 50 consecutive cases of primary gastric lymphoma, and prognostic factors were determined. The most common locations of gastric lymphoma in these patients were the antrum, pylorus, and lesser curvature. The size of the primary tumor varied from 0.3 to 15 cm. Of 41 patients who underwent resection and survived operation, the determinate 5-yr survival rate was 59% and the determinate 10-yr survival rate was 43%. Patients with T1 lesions (confined to the mucosa) or T2 lesions (involving the mucosa, the submucosa including the muscularis propria, and extending to or into the serosa but not penetrating through the serosa) had a determinate 5-yr survival rate of 82% and 65%, resp.; whereas patients with T3 lesions (penetrating through the serosa with or without invasion of contiguous structures) had a 5-yr determinate survival rate of only 24%. Patients without perigastric nodal metastases had a determinate 5-yr survival rate of 88%, while patients with N1 lesions (metastasis to the perigastric lymph nodes in the immediate vicinity of the primary tumor) had a determinate 5-yr survival rate of 32%. Overall, patients with primary gastric lymphoma appear to have a much better prognosis for survival than patients with gastric carcinoma since the latter present with far more frequent serosal penetration and nodal and distant metastases. Survival statistics obtained for each stage category in patients with primary gastric lymphoma were remarkably similar to survival statistics for each respective stage in gastric carcinoma patients.

5592 GASTRIC GLAND METAPLASIA IN THE SMALL AND LARGE INTESTINE.

(Eng.) Yokoyama, I.; Kozuka, S.; Ito, K.; Kubota, K.; Yokoyama, Y.; Kondo, T. (Nagoya Univ. Sch. Medicine, 65 Tsurumacho Showaku, Nagoya, 466, Japan). *Gut* 18(3):214-218; 1977.

Fifty-six surgical specimens with various ulcerative intestinal disorders were investigated histologicall for evidence of gastric gland metaplasia. Thirty-one specimens showed pyloric gland metaplasia. Among the 31 patients with pyloric gland metaplasia, 5 showed true gastric metaplasia, consisting of parietal cells, chief cells, and mucous neck cells. The percentage of true gastric metaplasia among pyloric gland metaplasia was as high as 16% with an overall frequency of 9% among various ulcerative intestinal disorders. The mechanism of pyloric gland metaplasia and true gastric metaplasia may occur secondarily to the submucosal response to ulcer healing and subsequent alteration of the intraluminal condition in the intestine.

5593 MEAT-STIMULATED GASTRIN RELEASE AND ACID SECRETION IN PATIENTS WITH PYLORIC STENOSIS.

(Eng.) Tani, M.; Shimazu, H. (Faculty Medicine, Univ. Tokyo, 7-3-1 Hongo, Bunkyo-Ku, Tokyo, Japan). *Gastroenterology* 73(2):207-210; 1977.

Different mechanisms of meat-stimulated acid secretion were studied in 5 patients with pyloric stenosis, 20 patients with inactive and 12 with active duodenal ulcer (DU), and in 10 healthy controls. Gastric acid secretion and gastrin levels were measured after instillation of tetragastrin or meat extract into the stomach of patients and controls. Basal gastric acid secretion and basal gastrin levels were also determined. Acid secretio in response to meat extract increased significantly above basal level and amounted to 50.2% of maximal tetragastrin response in healthy volunteers, 44.2% in the inactive DU group, 60.6% in the active DU group, and 82.4% in the pyloric stenosis group. In the inactive DU group the acid secretion in respons to meat extract was similar to that in healthy volu teers. In the active DU group, acid secretion in r sponse to meat extract was significantly higher tha in healthy volunteers (16.70 ± 1.93 mEq/hr versus 8.37 ± 1.62 mEq/hr, $p<0.005$) or in the inactive gro (10.24 ± 1.47 mEq/hr). However, integrated gastrin response to meat extract in the active DU group was similar to the levels in the inactive DU group or the healthy volunteers. In contrast, integrated gastrin response, acid response to meat extract, and maximal response to tetragastrin in the pyloric stenosis group showed the highest levels. Thus, the increased amount of gastric phase of acid secretion in the pyloric stenosis group is explained through a combination of release of an increased amount of gastrin and increased responsiveness of oxyntic cells. The increase in the inactive DU group is explained through increased responsiveness of oxyntic cells rather than through release of an increased amount of gastrin.

5594 RUPTURE OF THE STOMACH FOLLOWING OXYGEN INSUFFLATION INTO THE STOMACH. EXPERIMENTAL AND CLINICAL STUDY.

(Ger.) Geroulanos, S.; Hahnloser, P.; Senning, A. (Chirurgische Universitatsklinik A, Kantonsspital, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 43(5/6):803-807; 1976.

Four cases of stomach rupture following oxygen insufflation and the effect of stomach expansion on circulation, acid-base balance, and blood gases in dogs are described. One 60-yr-old woman who was given O_2 (4 l/min via a nasal catheter) for cardiac decompensation because dyspneic and cyanotic, went into shock, and died 2 hr later. At autopsy, an odorless gas escaped from the abdomen and two parallel mucosal ruptures 3 and 8 cm long were discovered in the stomach wall, with the longest rupture protruding into the stomach lumen. An oxygen tube (O_2, 4 l/min) was mistakenly connected to a stomach tube in a 32-yr-old patient given a cardiac valve prosthesis. The patient developed shortness of breath and upper gastric pain with swollen abdomen and went into shock. The error was discovered 5 min later; x-ray examination of the abdomen showed a massive pneumoperitoneum, and the peritoneal cavity was punctured. A laparotomy revealed a 12-cm-long seromuscular tear, which was repaired. Similar accidents occurred in a 34-yr-old man submitted to a stomach resection of duodenal ulcer and a 60-yr-old woman given a mastectomy for breast cancer who were inadvertently given O_2(4-6 l/min) into a stomach tube. Both patients recovered successfully. Experiments in pentobarbital-anesthetized dogs showed that stomach rupture occurred at pressures between 67 and 360 mm Hg; cardiac output decreased by 50% and oxygen saturation by 45% at a pressure of 80 cm H_2O. Increasing acidosis was noted; dangerous values were reached 1-2 min after pressure release.

5595 CIMETIDINE IN PATIENTS WITH GASTRIC ULCER: A MULTICENTRE CONTROLLED TRIAL.

(Eng.) Frost, F.; Rahbek, I.; Rune, S. J.; Jensen, K. B.; Gudmand-Hoyer, E.; Krag, E.; *et al.* (Glostrup Univ. Hosp., Glostrup, Denmark). *Br. Med. J.* 2(6090): 795-797; 1977.

The therapeutic efficacy of p.o. cimetidine (1 g/day) was compared with that of placebo in a double-blind trial of 45 adult outpatients with endoscopically confirmed gastric ulceration. After 6 weeks, 18 of the 23 patients receiving cimetidine showed complete ulcer healing, compared with only 6 of the 22 patients receiving placebo. The cimetidine group also had fewer days with pain than the placebo group, but the difference was not statistically significant. Cimetidine seems to promote healing of gastric ulcers without severe side-effects, although its effect on pain is less pronounced in patients with gastric ulcers than in patients with duodenal ulcers.

5596 PERSONALITY PATTERN OF PATIENTS WITH CHRONIC GASTRIC ULCER: STUDY OF NEUROTICISM AND EXTROVERSION IN A GASTRIC ULCER AND A CONTROL POPULATION.

(Eng.) Piper, D. W.; Greig, M.; Thomas, J.; Shinners, J. (Royal North Shore Hosp., St. Leonards, New South Wales 2065, Australia). *Gastroenterology* 73(3):444-446; 1977.

The personality patterns of 44 patients with chronic gastric ulcer were compared with a control group matched for age, sex, and place of residence. The personality pattern was studied by the Eysenck Personality Inventory, and personality was assessed in terms of neuroticism and extroversion. The relevance of social class was also studied. The gastric ulcer patients did not differ from the control group, except among the male population in which the gastric ulcer population was significantly more neurotic and less extroverted than their controls; the neuroticism score in the gastric ulcer patients was 10.73 ± 1.48, while that in controls was 6.87 ± 1.42 ($0.02>p>0.01$), and the extroversion score in ulcer patients was 7.87 ± 0.88, while that in the controls was 10.67 ± 1.71 ($0.01>p>0.001$).

5597 TOTAL GASTRECTOMY WITH SUBSTITUTE STOMACH.

(Ger.) Nadjafi, A. S. (Chirurgische Klinik, Stadtisches Krankenhaus, D-7990 Friedrichshafen/Bodensee, W. Germany). *Helv. Chir. Acta* 44(1/2):187-191; 1977.

A modified technique of jejunum reservoir construction after total gastrectomy or subtotal stomach resection for gastric cancer is described. The first jejunal loop is cut transversely (minimal skeletization of the mesenterium, only two vascular ligatures). The distal jejunal loop is pulled toward the rectocolon and an end-to-end anastomosis with the duodenum and a side-to-end anastomosis with the esophagus are done, followed by a long enteroanastomosis between both jejunal loops where the descending crus is again cut. The proximal end is included in the enteroanastomosis; the free end is pulled down toward the rectocolon and anastomosed end-to-end with the first jejunal loop. In order to maintain the esophagojejunal anastomosis and prevent reflux, the lateral walls of the reservoir crus are pulled up and affixed to the esophagus like a collar. Five such procedures were performed without postoperative complications and 2 months after surgery the reservoir has already approached the normal emptying time.

5598 EFFECT OF DIETARY FIBER ON COMPLICATIONS OF GASTRIC SURGERY: PREVENTION OF POSTPRANDIAL HYPOGLYCEMIA BY PECTIN. (Eng.) Jenkins, D. J. A.; Gassull, M. A.; Leeds, A. R.; Metz, G.; Dilawari, J. B.; Slavin, B.; *et al.* (Central Middlesex Hosp., Park Royal, London NW10 7NS, England). *Gastroenterology* 73(2):215-217; 1977.

The effect of pectin on blood glucose levels, breath H_2 (as an index of carbohydrate fermentation), and symptoms was investigated in nine postgastric surgery patients with hypoglycemia. Two hours after taking 50 g of glucose, the blood glucose levels in each patient had fallen below 50 mg/100 ml. The addition of 14.5 g of pectin to a 50-g p.o. glucose load prevented the occurrence of hypoglycemic symptoms and maintained the blood glucose levels above control values by 64% at 90 min ($p<0.002$) and 46% at 120 min ($p<0.01$). Breath H_2 production was abolished or reduced by pectin in all five cases in which this had previously occurred. A trial of 10 g of pectin daily has prevented severe recurrent postprandial hypoglycemic attacks for 5 weeks in the one patient in whom this was tried. Pectin and other unabsorbable polysaccharides are likely to prove useful in the treatment of abnormal carbohydrate absorption after gastric surgery.

5599 GASTRIC ULCER AFTER THE NISSEN FUNDOPLICATION: A COMPLICATION OF ALKALINE REFLUX. (Eng.) Bremner, C. G. (Dept. Surgery, Univ. Witwatersrand, Johannesburg, South Africa). *S. Afr. Med. J.* 51(22):791-793; 1977.

5600 EPIDEMIOLOGY OF GASTRIC AND COLO-RECTAL CANCER IN THE UNITED STATES AND CHILE WITH PARTICULAR REFERENCE TO THE ROLE OF DIETARY AND NUTRITIONAL VARIABLES, NITRATE FERTILIZER POLLUTION, AND N-NITROSO COMPOUNDS. (Eng.) Zaldivar, R. (2170 N.W. 11th St., Suite 53, Miami, FL 33125). *Zentralbl. Bakteriol.* [*Orig. B*] 164(3):193-217; 1977.

5601 FIBEROPTIC ENDOSCOPY OF THE STOMACH AFTER GASTRECTOMY. (Eng.) Bowden, T. A., Jr. (Medical Coll. Georgia, Augusta, GA 30902). *Am. Surg.* 43(5):287-291; 1977.

5602 PROSPECTIVE AND RETROSPECTIVE STUDIES FOR LONG YEARS ON THE CANCEROUS CHANGE FROM THE GASTRIC ULCER WITH FIBERSCOPIC BIOPSY AND GASTROCAMERA PICTURES. (Eng.) Oguro, Y.; Yoshida, S. (Natl. Cancer Center Hosp., Tsukiji 5-chome, Chuo-ku, Tokyo, 104 Japan). *Gastroenterol. Jpn.* 12(1):44-51; 1977.

5603 PYLORIC ORIGIN OF GASTRIC AND DUODENAL ULCERS: SURGICAL CONNOTATIONS. (Eng.) Costello, C. (Suite 268, Mercy Doctors Building, 621 S. New Ballas Rd., St. Louis, MO 63141). *Int. Surg.* 62(4):209-212; 1977.

5604 CROHN'S DISEASE OF THE STOMACH. (Eng.) Burbige, E. J. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *West. J. Med.* 126(5):397-400; 1977.

5605 VILLOUS ADENOMA OF THE STOMACH. (Eng.) Chang, T. H. (Nationwide Building, 164 Thompson Drive, Bridgeport, WV). *West Va. Med. J.* 73(5):95-98; 1977.

5606 EARLY GASTRIC CARCINOMA IN PATIENTS WITH A BILLROTH II PARTIAL GASTRECTOMY. (Eng. Osnes, M.; Lotveit, T.; Myren, J.; Serck-Hanssen, A (Ulleval Sykehus, Oslo 1, Norway). *Endoscopy* 9(1): 45-49; 1977.

5607 TREATMENT OF ALKALINE REFLUX GASTRITIS: A REPORT OF TWENTY CASES. (Eng.) De Mol J.; Derom, F.; Ceuppens, H.; De Roose, J.; Demeulenaere, L.; D'Haveloose, J. (Wilijenlaan 3, B-8730 Harelbeke, Gent, Belgium). *Acta Chir. Belg.* 76(3): 225-230; 1977.

5608 BENIGN GASTRIC ULCER AS A CAUSE OF GASTROCOLIC FISTULA: A REPORT OF 3 CASES. (Eng.) Rabin, M. S.; Philips, R. L. (Dept. Radiology, Univ. Witwatersrand, Johannesburg, South Africa *S. Afr. Med. J.* 51(26):990-992; 1977.

5609 GASTRIC DEVASCULARIZATION: A USEFUL SALVAGE PROCEDURE FOR MASSIVE HEMORRHAGIC GASTRITIS. (Eng.) Richardson, J. D.; Aust, J. B. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX). *Ann. Surg.* 185(6):649-655; 1977.

5610 HARMFUL EFFECTS OF "ASPIRIN COMPOUNDS." (Eng.) Najjar, T. A. (Coll. Medicine and Dentistry of New Jersey, 100 Bergen St., Newark, NJ 07103). *Oral Surg.* 44(1):64-70; 1977.

5611 STOMACH CONTAINED IN A GIANT SCROTAL HERNIA. (Eng.) Nagendran, T. (Veterans Admin. Hosp., Tuskegee, AL). *Am. Surg.* 43(7):473-476; 1977.

5612 CRONKHITE-CANADA SYNDROME: CASE REPORT. (Eng.) Kindblom, L. G.; Angervall, L.; Santesson, B.; Selander, S. (Vasa Hosp., S-411 33 Goteborg, Sweden). *Cancer* 39(6):2651-2657; 1977.

5613 SERUM COPPER AND CERULOPLASMIN LEVELS IN PATIENTS WITH NEOPLASMS LOCALIZED IN THE STOMACH, LARGE INTESTINE OR LUNG. (Eng.) Scanni, A.; Licciardello, L.; Trovato, M.; Tomirotti, M.; Biraghi, M. (Ospedale Fatebenefratelli-Oftalmico, Milan, Italy). *Tumori* 63(2):175-180; 1977.

14 SERUM FERRITIN AND BODY IRON STATUS AFTER
GASTRIC OPERATIONS. (Eng.) Lloyd, D. A.;
lberg, L. S. (Univ. Hosp., Box 5339, Terminal
London, Ontario N6A 5A5, Canada). *Am. J. Dig.*
s. 22(7):598-604; 1977.

15 PLASMA 25-HYDROXYVITAMIN D AND URINARY
CYCLIC AMP IN GERMAN PATIENTS WITH SUB-
TAL GASTRECTOMY (BILLROTH II). (Eng.) v. Lilien-
ld-Toal, H.; Mackes, K. G.; Kodrat, G.; Ochs, H.;
nnenberg, A. (Medizinische Universitatsklinik,
00 Bonn-Venusberg, W. Germany). *Am. J. Dig. Dis.*
(7):633-636; 1977.

6 CONGENITAL DOUBLE PYLORUS: A CASE REPORT
AND REVIEW OF THE LITERATURE. (Eng.)
fian, S.; Ominsky, S.; Matsumoto, T. (Hahnemann
lical Coll. and Hosp., 230 N. Broad St., Phila-
lphia, PA 19102). *Gastroenterology* 73(1):154-
'; 1977.

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AFTER ENDOSCOPY. (Eng.) Shields, H. M.;
oway, R. D.; Long, W. B.; Weiss, J. B. (Washington
iv. Medical Center, 660 S. Euclid Ave., St. Louis,
63110). *Gastroenterology* 73(1):164-165; 1977.

18 GASTRIC SECRETION AND DISEASES OF THE
MUCOSAL BARRIER. (Eng.) Baron, J. H.
mmersmith Hosp., London W1, England). *Rend.*
stroenterol. 9(1):41-46; 1977.

19 ADULT HYPERTROPHIC PYLORIC STENOSIS:
REPORT OF AN UNUSUAL CASE DETECTED BY
INE LOAD TEST. (Eng.) Caldwell, J. H.; Cerilli,
J. (410 W. 10th Ave., Columbus, OH 43210). *Am.*
Gastroenterol. 67(3):261-264; 1977.

5620 DYNAMICS OF ANTRAL AND FUNDAL GASTRITIS IN AN ESTONIAN RURAL POPULATION SAMPLE. (Eng.) Kekki, M.; Villako, K.; Tamm, A.; Siurala, M. (Pension Insurance Company Ilmarinen, Eerikinkatu 41, 00180 Helsinki 18, Finland). *Scand. J. Gastroenterol.* 12(3):321-324; 1977.

5621 GASTROSCOPIC CYTOLOGY IN INTESTINAL METAPLASIA. (Eng.) Perez-Mota, A.; Casanova, A.; Hidalgo, A. (Ambulatorio Hermanos Aznar Servico-Escuela de Enferedades Digestivas, Modesto Lafuente 21, E-3 Madrid, Spain). *Endoscopy* 9(1):1-6; 1977.

5622 INFLUENCE OF AGE AND STOMACH FUNCTION ON SERUM VITAMIN B_{12} CONCENTRATION. (Eng.) Doscherholmen, A.; Ripley, D.; Chang, S.; Silvis, S. E. (Veterans Admin. Hosp., Minneapolis, MN). *Scand. J. Gastroenterol.* 12(3): 313-319; 1977.

See also, 5322, 5371, 5373, 5374, 5477, 5478, 5488, 5502, 5530, 5532, 5536, 5539, 5547, 5552, 5555, 5557, 5559, 5562, 5563, 5564, 5565, 5568, 5571, 5573, 5575, 5577, 5579, 5580, 5583, 5623, 5624, 5628, 5629, 5630, 5634, 5635, 5636, 5637, 5644, 5645, 5646, 5647, 5693, 5939, 5940, 5941, 5942, 5943, 5949, 5950.

STOMACH

Peptic Ulcers

3 EFFECT OF ATROPINE ON FOOD-STIMULATED
GASTRIN RELEASE AFTER TRUNCAL VAGOTOMY IN
. (Eng.) Hansky, J.; King, R. W. F. (Prince
ry's Hosp., Melbourne, Australia 3004). *Gas-*
enterology 73(2):205-206; 1977.

determine whether vagal integrity is necessary
the enhancement of gastrin release by atropine,
dies were carried out in 10 men 2-17 months
er truncal vagotomy. Atropine (1.2 mg, i.m.)
no effect on the basal level of serum immuno-
ctive gastrin, but it caused a significant in-
ase in both the peak postprandial gastrin (135-
pg/ml without atropine, 139-308 pg/ml with atropine) and the integrated gastrin response (10.2 and 15.5 ng/min/ml for 2 hr, resp., $p<0.05$). This indicates that vagal integrity is not essential for the enhancement of the gastrin response by atropine and implies a direct effect by atropine on the antral gastrin cell.

5624 EFFECT OF ATROPINE AND PROXIMAL GASTRIC VAGOTOMY ON THE ACID RESPONSE TO FUNDIC DISTENSION IN MAN. (Eng.) Grotzinger, U.; Bergegardh, S.; Olbe, L. (Sahlgren's Hosp., Goteborg, Sweden). *Gut* 18(4):303-310; 1977.

The mechanisms by which distention of the oxyntic gland area elicits gastric acid secretion were studied in 4 healthy men and 12 men with duodenal ulcer (DU). Graded balloon distention of the gastric fundus and body caused increments in acid output related to the distention volumes in all subjects. The mean peak distention response amounted to about 50% of the mean peak acid output (PAO_{pg}) evoked by i.v. infusion of pentagastrin (300 μg/hr), eliciting maximum observed secretory response. During distention with the largest balloon volume, 1.0 mg of atropine injected i.v. significantly depressed the acid secretory rate, the median inhibition amounting to about 80%. In two patients with DU, 2-5 mg of atropine completely abolished acid secretion during fundic distention. In nine subjects with DU, complete proximal gastric vagotomy profoundly depressed the secretory responses to graded fundic distention, eliminating the acid response to the smallest balloon volume used. A slight, but significant, response to the largest distention volume persisted after complete vagotomy. Incomplete proximal gastric vagotomy in five patients reduced the distention responses only moderately, and the peak acid response to fundic distention as related to PAO_{pg} remained unchanged. Distention of the gastric fundus and body in man stimulates acid secretion by an atropine-sensitive, presumably cholinergic, reflex mechanism. The findings after vagotomy are in agreement with the concept that this reflex mechanism is conveyed by both short intramural and long vagovagal pathways.

5625 CONTROLLED TRIALS OF ALUMINUM HYDROXIDE GELS FOR PEPTIC ULCER.

(Eng.) Littman, A.; Welch, R.; Fruin, R. C.; Aronson, A. R. (Veterans Admin. Hosp., Hines, IL 60141). *Gastroenterology* 73(1):6-10; 1977.

Experiments conducted over a 14-yr period to determine whether aluminum hydroxide gel (AG) is effective in relieving peptic ulcer pain are described. In 44 individual pain episodes, complete relief was obtained by 15-ml doses of AG in 79% and by an indistinguishable dummy gel (DG) in 45% ($p<0.05$). In 48 identical blind trials replicated at another hospital, the difference was not significant. The gels were also tested against ulcer pain induced by intragastric acid instillation (Palmer test) in 35 patients; pain was relieved by AG in 63% and by DG in 62%. Presumed effectiveness in terminating ulcer episodes was studied in 65 patients admitted for pain; 37 received milk and cream hourly, and 28 did not. All were treated with 15 ml of AG or DG during waking hours. Median time for complete disappearance of spontaneous pain was 3 days for AG and 7 days for DG, the same in both groups. The acid instillation test was repeated every few days in all patients. For the milk and cream group it became negative after 4 days with AG and after 6 days with DG. In 18 patients with gastric ulcer treated for 4 weeks, AG led to greater reductions in size than did DG. A number of these trials indicate AG to be more effective than DG, but sampling and other methodological problems limit the certainty of any conclusions.

5626 EFFECTIVE CIMETIDINE THERAPY OF DUODENAL ULCER: RESULTS OF DOUBLE BLIND STUDY.

(Ger.) Domschke, W.; Domschke, S.; Lux, G.; Belohlavek, D.; Neidhardt, B.; Demling, L. (Medizinische Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, Krankenhausstr. 12, 8520 Erlange W. Germany). *Dtsch. Med. Wochenschr.* 101(48):1752-1755; 1976.

Effectiveness of treatment of 12 male duodenal ulce patients with the histamine H_2-receptor antagonist cimetidine (4 x 200 mg/day, p.o.) was demonstrated in comparison to treatment with a placebo (lactose capsules) in a double-blind study. Half-time of ulcer healing was approximately 6 days for cimetidine and 20 days for the placebo. Healing was significantly more rapid in cimetidine-treated patients than in those on placebo ($p< 0.0005$). Four week cimetidine therapy did not produce any changes in gastric secretion of acid, protein, pepsin, and *N*-acetylneuraminic acid-containing glycoproteins or in bicarbonate and enzyme production and in clinical-chemical parameters.

5627 POST-VAGOTOMY INSULIN TEST: IMPROVED PREDICTABILITY OF ULCER RECURRENCE AFTER CORRECTIONS FOR HEIGHT AND COLLECTION ERRORS.

(Eng.) Maybury, N. K.; Faber, R. G.; Hobsley, M. (Middlesex Hosp. and Medical Sch., London, England). *Gut* 18(6):449-456; 1977.

To investigate the influence of sex and height in duodenal ulcer, insulin-stimulated gastric secretion was studied in 20 women and 54 men with unoperated duodenal ulcer (DUs). Three indices of secretion were studied: observed volume, acid outpu and volume of gastric juice corrected for pyloric loss and duodenal reflux (Vg). These three measurements were expressed both as peak secretion and as secretion during the 0.5- to 2.0-hr period after i sulin administration and also both before and afte standardization for height, making 12 different in ces in all. A significant correlation between insulin-stimulated secretion and height in DUs was fou A method of standardizing each patient's secretion for height is described. There was a significantl higher insulin-stimulated secretion in men than in women, and this difference could be explained by their difference in height. For each of the 12 indices of secretion, the range of secretion for the unoperated subjects was obtained. The same indices were measured in 155 postvagotomy patients including 33 patients with recurrent DUs, and compared with the ranges of secretion established in the unoperated patients. Responses above the lowe 95% tolerance limit of the preoperative range were designated positive and those below negative. The Hollander status was determined. It was found tha the least satisfactory criterion was Hollander's (7% false-negative and 69% false-positive). The best was 0.5-2 Vg standardized for height (3% fals negatives and 43% false positives). The improvement in predictability was significant at the 0.0005 level.

5628 THE EFFECT OF TRIMIPRAMINE (SURMONTIL®) ON SYMPTOMS AND HEALING OF PEPTIC ULCER. A DOUBLE BLIND STUDY. (Eng.) Wetterhus, S.; Aubert, E.; Berg, C. E.; Bjerkeset, T.; Halvorsen, L.; Hovdenak, N.; *et al.* (St. Joseph's Hosp., Porsgrunn, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 43):33-38; 1977.

5629 THE EFFECT OF TRIMIPRAMINE ON THE HEALING OF PEPTIC ULCER. A DOUBLE-BLIND STUDY. MULTICENTRE INVESTIGATION--G.P. (Eng.) Nitter, L., Jr.; Haraldsson, A.; Holck, P.; Hoy, C.; Munthe-Kaas, J.; Myrhol, K.; *et al.* (No affiliation given). *Scand. J. Gastroenterol.* 12(Suppl. 43):39-41; 1977.

5630 THE NOCTURNAL INTRAGASTRIC pH IN EEG SLEEP STAGES IN PEPTIC ULCER PATIENTS. (Eng.) Segawa, K.; Mabuchi, C.; Shiozawa, Z.; Nakazawa, S. (Nagoya Univ. Sch. Medicine, 65 Tsuruma-cho, Showa-ku, Nagoya 466, Japan). *Gastroenterol. Jpn.* 12(1):1-6; 1977.

5631 THE EFFECT OF TRI-POTASSIUM DI-CITRATO BISMUTHATE (DE-NOL) ON THE HEALING OF CHRONIC DUODENAL ULCERS. (Eng.) Coughlin, G. P.; Kupa, A.; Alp, M. H. (Queen Elizabeth Hosp., Woodville, South Australia 5011). *Med. J. Aust.* 1(9): 294-298; 1977.

5632 INFLUENCE OF CHOLECYSTOKININ ON PYLORIC REFLUX AFTER OPERATION FOR GALLSTONES AND PEPTIC ULCER. (Eng.) Fleury, A.; Poxon, V.; Dorricott, N.; Keighley, M.; Alexander-Williams, J. (General Hosp., Steelhouse Lane, Birmingham, B4 6NH, England). *Proc. R. Soc. Med.* 70(5): 367-368; 1977.

5633 PEPTIC ULCERATION, GASTRIC SECRETION, AND RENAL TRANSPLANTATION. (Eng.) Chisholm, G. D.; Mee, A. D.; Williams, G.; Castro, J. E.; Baron, J. H. (Hammersmith Hosp., London W12 OHS, England). *Br. Med. J.* 1(6077):1630-1633; 1977.

5634 EFFECT OF ATROPINE AND METOCLOPRAMIDE ON SERUM GASTRIN RESPONSE TO PROTEIN IN PATIENTS WITH DUODENAL ULCERS. (Eng.) Spitaels, J. M.; Moshal, M. G.; Rawat, R.; Pillay, K. (King Edward VIII Hosp., Durban, South Africa). *S. Afr. Med. J.* 52(2):69-70; 1977.

5635 INTRAVENOUS GLUCOSE, AMINOACIDS, AND FAT IN THE POSTOPERATIVE PERIOD: A CONTROLLED EVALUATION OF EACH SUBSTRATE. (Eng.) Craig, R. P.; Tweedle, D.; Davidson, H. A.; Johnston, I. D. A. (British Military Hosp., Rinteln, B.F.P.O. 29, W. Germany). *Lancet* 2(8027):8-11; 1977.

5636 MAXIMAL ACID OUTPUT AND RISK OF ULCER [Letter to Editor]. (Eng.) Marks, I. N.; Bank, S.; Louw, J. H. (Groote Schuur Hosp., Observatory, Cape, South Africa). *Lancet* 1(8025): 1316-1319; 1977.

5637 PERFORATED PEPTIC ULCER: AN ANALYSIS OF 246 CASES. (Eng.) Anseline, P. (Royal Newcastle Hosp., Newcastle, New South Wales 2300, Australia). *Aust. N.Z. J. Surg.* 47(1):81-85; 1977.

5638 METIAMIDE THERAPY OF BLEEDING PEPTIC ULCER DURING CHRONIC HEMODIALYSIS. (Eng.) Kruss, D. M.; Ilangovan, S. (Box 148, Veterans Admin. Hosp., Hines, IL 60141). *Am. J. Dig. Dis.* 22(7):662-663; 1977.

5639 FACTS, ANECDOTES, AND NEW HORIZONS IN THE MEDICAL TREATMENT OF DUODENAL ULCERS. (Eng.) Barreras, R. F. (1300 University Ave., Madison, WI 53706). *Surg. Clin. North Am.* 56(6): 1243-1248; 1976.

5640 IMPROVED RADIOGRAPHIC DETECTION OF MULTIPLE GASTRIC ULCERS. (Eng.) Bloom, S. M.; Paul, R. E., Jr.; Matsue, H.; Poplack, W. E.; Goldsmith, M. R. (Tufts-New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Am. J. Roentgenol.* 128(6):949-952; 1977.

5641 CHOLINERGIC SUPPRESSION OF THE ACID RESPONSE TO PENTAGASTRIN IN NORMOSECRETING AND HYPERSECRETING DUODENAL ULCER PATIENTS. (Eng.) Lam, S. K.; Sircus, W. (Western General Hosp., Crewe Rd., Edinburgh EH4 2XU, Scotland). *Rend. Gastroenterol.* 9(1):9-12; 1977.

5642 MEDICAL TREATMENT OF DUODENAL ULCER. (Eng.) Wormsley, K. G. (Ninewells Hosp., Dundee DD2 1UB, Scotland). *Rend. Gastroenterol.* 9(1):32-40; 1977.

5643 GASTRIC ULCER IN A YOUNG MAN WITH APPARENT HEALING. (Eng.) Fremland, A. (Zion Hosp., La Mesa, CA 92041). *Am. J. Roentgenol.* 128(5):831-834; 1977.

5644 OPERATIVE COMPLICATIONS OF ABDOMINAL VAGOTOMY. (Eng.) Santos, G. H.; Nordberg, R. E.; Stamford, W. P.; Efron, G. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Am. J. Surg.* 133(6):662-664; 1977.

STOMACH

5645 THE EFFECT OF TRIMIPRAMINE (SURMONTIL®) ON MASKED DEPRESSION IN PATIENTS WITH DUODENAL ULCER. A DOUBLE-BLIND STUDY. (Eng.) Guldahl, M. (Regional Hosp., Trondheim, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 43):27-31; 1977.

5646 170 PATIENTS FIVE YEARS AFTER SELECTIVE GASTRIC VAGOTOMY--WITH AN UNCONTROLLED COMPARISON OF ULCER RECURRENCE FOLLOWING EITHER HEINEKE-MIKULICZ OR FINNEY PYLOROPLASTY. (Eng.) Jensen, E.; Jensen, H. E.; Amdrup, E. (Kommunehospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 142(7):533-536; 1976.

5647 GASTRIC ACID SECRETION IN PATIENTS WITH PREPYLORIC ULCER AND WITH COMBINED GASTRIC AND DUODENAL ULCER. (Eng.) Dahlgren, S.; Nordgren, B. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 142(8):599-604; 1976.

See also, 5369, 5465, 5555, 5571, 5603, 5776, 5941, 5955.

SMALL INTESTINE

5648 THE EFFECT OF PELVIC IRRADIATION ON ILEAL FUNCTION. (Eng.) Stryker, J. A.; Hepner, G. W.; Mortel, R. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Radiology* 124(1):213-220; 1977.

The role of ileal dysfunction as a factor in the etiology of radiation-induced diarrhea was studied in 33 patients using the $[1\text{-}^{14}C]$cholyl glycine breath test. All patients (aged 44-78 yr) were undergoing radiotherapy to the pelvis for gynecological neoplasms. Breath tests were performed in the 1st and 5th weeks of treatment and 19 patients had a third test 3 months after treatment. In the first test, 29.9 ± 16.8% of the administered dose was excreted in breath ^{14}C in 24 hr. This rose to 47.3 ± 15.9% ($t=6.08$, $p<0.001$) in the 5th week and fell to 36.3 ± 16% ($t=2.29$, $p<0.05$) at 3 months. Eight patients had breath tests performed 1 yr post-treatment, and the test percentages were 32.7 ± 7.8% ($t=1.19$, $p>0.10$). The increase in $^{14}Co_2$ excretion in the 5th week of treatment occurred at a time when most patients were having diarrhea. The data suggest that bile acid malabsorption due to ileal dysfunction may be a factor in radiation-induced diarrhea, which occurs in nearly all patients during pelvic irradiation.

5649 APPLICATION OF A STABLE ISOTOPE (^{13}C)-LABELED GLYCOCHOLATE BREATH TEST TO DIAGNOSIS OF BACTERIAL OVERGROWTH AND ILEAL DYSFUNCTION. (Eng.) Solomons, N. W.; Schoeller, D. A.; Wagonfeld, J. B.; Ott, D.; Rosenberg, I. H.; Klein, P. D. (Pritzker Sch. Medicine, Chicago, IL). *J. Lab. Clin. Med.* 90(3):431-439; 1977.

Stable isotope labeling and mass spectrometric analysis were applied to the development of a glycocholate (GC) deconjugation breath test using ^{13}C as the isotopic marker. In 13 adults with a wide range of conditions associated with upper intestinal bacterial overgrowth or ileal dysfunction, the intraluminal deconjugation of standard glycocholate-1-^{14}C-glycine was compared to that of simultaneously administered glycocholate-1-^{13}C-glycine or glycocholat 1,2-^{13}C-glycine. The correlations of net deconjugation as measured by the radioactive isotope- and stable isotope-labeled bile salt were excellent (correlation coefficient=0.952). Exogenous bile salts did not affect the reproducibility of the breath test. There was statistical identity between the results of tests using glycocholate-1-^{13}C-glycin or glycocholate-1,2-^{13}C-glycine. The calculated detection limits employing a dose of 7.5 mg/kg body weight of glycocholate-1,2-^{13}C-glycine were 4.7% and 6.2% at the 95% and 99% confidence levels, resp. This test offers potential advantages of safety and acceptability for infants, children, pregnant women, and women at risk of pregnancy.

5650 INTESTINAL BYPASS ARTHRITIS: ASSOCIATION WITH CIRCULATING IMMUNE COMPLEXES AND HLA B27. (Eng.) Rose, E.; Espinoza, L. R.; Osterland, C. K. (Royal Victoria Hosp., Montreal, Quebec H3A 1A1, Canada). *J. Rheumatol.* 4(2):129-134; 1977.

The cases of two patients in whom arthritis following intestinal bypass surgery for obesity was associated with the presence of circulating immune complexes (CIC) and histocompatibility antigen (HLA) B27 are described. The arthritis was characteristically intermittent and controlled by low dose prednisone, indomethacin, and tetracycline therapy. The findings suggest that immune complexes play a role in the pathogenesis of arthritis associated with this condition, and that the association with HLA B27 may predispose to the development of this complication.

5651 PNEUMATOSIS CYSTOIDES INTESTINALIS FOLLOWING INTESTINAL BYPASS. (Eng.) Ikard, R. W. (Suite 600, Doctor's Pavilion, 1916 Patterson St. Nashville, TN 37203). *Am. Surg.* 43(7):467-470; 1977

Two cases of pneumatosis cystoides intestinalis occurring in the bypassed small bowel following intestinal bypass for treatment of obesity are presented. The first patient, a 36-yr-old woman, underwent an end-to-end jejunoileostomy, using 10 inches of proximal jejunum and 8 inches of distal ileum. The patient tolerated the procedure poorly, experiencing diarrhea, intermittent hypokalemia, nausea, weakness, and anorexia. Normal bowel continuity was restored, and, at this laparotomy, the distal one-third of the defunctionalized small bowel was found to be coated with thin cysts measuring 1-3 cm in diameter. The cysts were entirely in the subserosal plane. The ileosigmoid colostomy was markedly dilated, and there were feces in the distal part of the bypassed ileum. The second patient, a 36-yr-old woman, tolerated a similar procedure well, and the initial postoperative course was uncomplicated. She died of acute myocardial infarction 10 months later, and autopsy revealed numerous gas-containing cysts in all layers of the bowel, although most prominently in the subserosal plane. In addition, the mesenteric attachments, adjacent connective tissues, and regional lymph nodes were involved. Microscopic examination revealed the cysts to be lined by numerous giant cells with a granulomatous and fibrous reaction in the stroma around the cysts. Stain and culture of the cysts for bacteria, fungi, and *Mycobacterium tuberculosis* were negative. The etiology of these lesions is unknown, but is probably related to fecal reflux into defunctionalized bowel with the attendant alteration of bacterial flora.

5652 STUDIES OF IDIOPATHIC INTESTINAL PSEUDO-OBSTRUCTION. I. HEREDITARY HOLLOW VISCERAL MYOPATHY: CLINICAL AND PATHOLOGICAL STUDIES. (Eng.) Schuffler, M. D.; Lowe, M. C.; Bill, A. H. (United States Public Health Service Hosp., P.O. Box 3145, Seattle, WA 98114). *Gastroenterology* 73(2):327-338; 1977.

The case of a 15-yr-old girl with idiopathic intestinal pseudo-obstruction is reported. She presented with a long-term history of low grade obstructive symptoms, diarrhea, and poor nutrition culminating in an acute obstructive attack leading to exploratory laparotomy. At surgery, the small bowel and colon were dilated, with no mechanical obstruction found. Further evaluation revealed a diffuse disorder of gastrointestinal smooth muscle function involving esophagus, small bowel, and colon. Because medical management failed to control symptoms, a gastrojejunostomy was carried out to bypass a megaduodenum. A third laparotomy was necessary 2 months later because of intractable obstructive symptoms. At this last laparotomy, the afferent loop was taken down, and a duodenoplasty and duodenojejunostomy were performed, resulting in clinical improvement. Light and electron microscopy of the excised small intestine showed marked thinning and degeneration of the smooth muscle, with replacement by fibrous tissue. Marked vacuolization was present. The myenteric plexus was normal. This case demonstrates that a degenerative disease of smooth muscle may be one cause of idiopathic intestinal pseudo-obstruction.

5653 ENDOMETRIOSIS OF THE SMALL INTESTINE. REPORT OF FOUR NEW CASES OF STENOSIS OF THE SMALL INTESTINE. (Fre.) Leborgne, J.; Arzul, C.; Le Neel, J. C.; Visset, J. (Clinique Chirurgicale A, place Alexis-Ricordeau, 44035 Nantes, France). *J. Chir. (Paris)* 113(2):143-151; 1977.

Four new cases of stenosis of the ileum caused by intestinal endometriosis in women aged 45-52 yr are reported. This rare complication is very difficult to diagnose, since 50% of cases are without associated genitopelvic symptoms. However, the condition must be considered when an isolated ileal tumor is accompanied by the catamenial recurrence of digestive problems. Surgical intervention is almost always necessary to confirm the diagnosis. Since the intestinal mucosa remains intact, the condition is easily differentiated from a malignant process, and a limited resection is indicated. Hormone therapy should be routinely instituted postoperatively.

5654 GARDNER'S SYNDROME AND DUODENAL ADENOCARCINOMA. (Fre.) Suzanne, J.; Camelot, G.; Miguet, J. P.; Carbillet, J. P.; Gillet, M.; Carayon, P.; Gisselbrecht, H. (Service d'Hepato-gastroenterologie, Centre Hospitalier et Universitaire, place Saint-Jacques, F-25030 Besancon, France). *Gastroenterol. Clin. Biol.* 1(5):455-460; 1977.

A case of adenocarcinoma of the ampulla of Vater is reported in a 46-yr-old man with Gardner's syndrome. This rare type of cancer is almost always associated with duodenal polyps, which are found in 10% of cases of familial multiple polyposis. Since the risk of malignant degeneration of duodenal polyps is extremely high in patients with Gardner's syndrome, a preventative duodenopancreatectomy may be advisable. If the duodenal polyps are few or isolated, a polypectomy and/or endoscopic surveillance may be indicated.

5655 IMMUNOBLASTIC SARCOMA (RETICULUM-CELL SARCOMA) OF THE GASTRO-INTESTINAL TRACT IN A CASE OF DERMATITIS HERPETIFORMIS DUHRING. (Ger.) Gebbers, J. O.; Otto, H. F.; Muller-Weiland, K. (Pathologisches Institut der Universitat, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Dtsch. Med. Wochenschr.* 102(7):242-247; 1977.

A 43-yr-old man with a 20-yr history of dermatitis herpetiformis had a concurrent reticulum cell sarcoma of the upper jejunum and abdominal lymph nodes for the past 4 yr. Initially, the patient complained of abdominal pain, weight loss, and diarrhea. A partial Billroth II stomach resection was done at which time callous changes of the proximal jejunum were found along with a red, edematous, rigid wall. The small intestinal mucosa showed no folds and was covered with white spots, and the mesenteric lymph nodes were enlarged. At this time a pyloric ulcer and Crohn's disease of the small intestine were diagnosed, and pathological findings revealed nonspecific gastroduodenitis or jejunitis. The patient continued to lose weight and was readmitted with acute intestinal bleeding followed by vomiting, diarrhea, and tarry stools. Roentgenological tests showed marked swelling and irregular folds in the loop of the small intestine. Several biopsies revealed partial to subtotal villous atrophy with crypt hyperplasia. Three esophagogastrojejunoscopies showed the absence of the Kerckring's fold with rigid, edematous mucosa and isolated ulcers. The patient died shortly thereafter in a state of high-grade cachexia and in protracted cardiocirculatory failure. Autopsy revealed an immunoblastic sarcoma of the gastrointestinal tract with involvement of all mesenteric, portal, and parapancreatic lymph nodes and with segmental stenosing infiltration of proximal segments of the jejunum. Histologically, a diffuse tumor infiltration with superficial mucosal ulceration was noted in the area of the proximal jejunum. The tumor consisted of large, round, or oval anisomorphic cells with basophilic cytoplasm.

5656 SMALL BOWEL ISCHAEMIA AND INFARCTION IN YOUNG WOMEN TAKING ORAL CONTRACEPTIVES AND PROGESTATIONAL AGENTS.

(Eng.) Hoyle, M.; Kennedy, A.; Prior, A. L.; Thomas, G. E. (Harry Hines Medical Bldg., 6161 Harry Hines Blvd., Dallas, TX). *Br. J. Surg.* 64(8):533-537; 1977.

The cases of three patients with small bowel infarction associated with oral contraceptives and progestational agents are presented. The patients ranged in age from 24-42 yr and had been taking oral contraceptives for 18 months to 3.5 yr. All patients were heavy smokers and all were of blood group A. Two patients were obese, and one of these was hypertensive. Two patients showed an increased production of fibrinogen degradation products postoperatively, requiring heparin to lower these and to prevent further necrosis. Two infarctions were due to superior mesenteric artery thrombosis and one to superior mesenteric vein thrombosis. Smoking, blood group A, and the presence of hypertension, in addition to oral contraceptives, may have contributed to small bowel infarction in these patients.

5657 RECURRENT ULCERATIVE JEJUNOILEITIS. OPERATIVE AND ENDOSCOPIC STUDY OF A NEW CASE.

(Fre.) Gouffier, E.; Phan, A.; Paraf, A.; Boddaert, A.; Chevrel, J. P. (Service de Medecine Interne et de Gastroenterologie, Hopital Franco-Musulman, F-93009 Bobigny, France). *Gastroenterol. Clin. Biol.* 1(6/7):545-552; 1977.

The case of a 35-yr-old woman with recurrent ulcerative jejunoileitis (RUJ) of 20 yr duration is described. Her attacks were characterized by fever, acute abdominal pain, and diarrhea and were separated by long symptomless intervals. An exploratory laparotomy and preoperative endoscopy showed multiple, nonspecific jejunal ulcerations separated by areas of normal or partly atrophied mucosa. RUJ may be differentiated from celiac disease by the absence of complete atrophy of the jejunal mucosa and by the ineffectiveness of a gluten-free diet and of corticosteroids. The evolution of RUJ is extremely variable, and the prognosis is usually very poor; 14/25 cases mentioned in the literature terminated fatally. Death in this case was caused by occlusions, perforations, hemorrhages, and infections; no fatal malabsorption syndrome was recorded.

5658 'ENTERAL' HYPEROXALURIA: EFFECT OF CHOLESTYRAMINE, CALCIUM, NEOMYCIN, AND BILE ACIDS ON INTESTINAL OXALATE ABSORPTION IN MAN.

(Eng.) Caspary, W. F.; Tonissen, J.; Lankisch, P. G. (Medizinischen Universitats Klinik, Humboldtalle 1, 3400 Gottingen, W. Germany). *Acta Hepatogastroenterol.* 24(3):193-200; 1977.

The effect of the oral administration of cholestyramine, neomycin, calcium, and bile acids on intestinal ^{14}C-oxalate absorption and urinary oxalate excretion was assessed in patients with normal or increased urinary oxalate excretion. Cholestyramine (8 or 16 g), neomycin (4.5 g), and acute administration of chenodeoxycholic acid (2.75 g/24 hr) did not affect significantly ^{14}C-oxalate absorption or urinary oxalate excretion. Oral administration of calcium (1.5 g) reduced ^{14}C-oxalate absorption by 88.2% and urinary oxalate excretion by 46%. Calcium-induced reduction of intestinal oxalate absorption was more pronounced in patients with hyperabsorption of oxalate than in subjects with normal oxalate absorption or excretion. Patients being treated with high doses of chenodeoxycholic acid (1.5-2.0 g/day) for dissolution of cholesterol gallstones had increased oxalate absorption and excretion; patients on long-term treatment with lower doses of chenodeoxycholic acid (0.75-1.0 g/day) exhibited normal absorption or urinary excretion of oxalate. The results suggest that calcium and bile acids play an important role in the pathogenesis of "enteric" hyperoxaluria. The beneficial therapeutic effect of cholestyramine in hyperoxaluria du to ileal resection may be caused by its bile acid binding property rather than by direct binding of oxalate within the intestinal lumen.

5659 DUODENAL INTUSSUSCEPTION SECONDARY TO BRUNNER'S GLAND HAMARTOMA: A CASE REPORT

Rieth, K. G.; Abbott, G. F.; Gray, G. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *Gastrointest. Radiol.* 2 (1):13-16; 1977.

5660 FOOD AS A CAUSE OF SMALL INTESTINAL OBSTRUCTION: A REPORT OF FIVE CASES WITHOUT PREVIOUS GASTRIC SURGERY.

(Eng.) Strauss, S.; Rubinstein, Z. J.; Shapira, Z.; Jacob, E. T. (Chaim Sheba Medical Center, Tel Hashomer, Israel). *Gastrointest. Radiol.* 2(1):17-20; 1977.

5661 S-TRYPTOPHAN CONCENTRATIONS AFTER INTESTINAL BYPASS IN EXTREME OBESITY.

(Eng.) Backman, L.; Johansson, C.; Thoren, P.; Allgen, L. G.; Hallberg, D. (Karolinska Hosp., Stockholm, Sweden). *Acta Med. Scand.* 201(4):285-289; 1977.

5662 MASSIVE GASTROINTESTINAL BLEEDING AND PERFORATION OF A DUODENAL DIVERTICULUM WITH COEXISTING PANCREATITIS. (Eng.) Ettman, I. K.; Kongtawng, T. (Veterans Admin. Hosp., Univ. Tennessee, 1030 Jefferson Ave., Memphis, TN 38104). *South. Med. J.* 70(6):761-763; 1977.

5663 VITAMIN B_{12} AND BILE ACID METABOLISM IN PATIENTS WITH PARTIAL ILEAL RESECTION. (Eng.) Stokkers, P.; Bosman, G.; Esseveld, M. R.; Huibregtse, K.; Hoek, F.; Tytgat, G. N. J. (Dept. Internal Medicine, Wilhelmina Gasthuis, Amsterdam, Netherlands). *Digestion* 15(4):356-360; 1977.

5664 MALIGNANT TUMORS OF THE INTESTINE: A REVIEW OF 37 CASES. (Eng.) Rich, J. D. (Fitzsimmons Army Medical Center, Denver, CO 80240). *Am. Surg.* 43(7):445-454; 1977.

5665 ACUTE TERMINAL ILEITIS AND Yersinia enterocolitica INFECTION. (Eng.) Kato, Y.; Hattori, T.; Oh-ya, H.; Yoshino, S.; Kato, H.; Nishikawa, H. (Nagoya Univ. Sch. Medicine, 65 Tsuruma-cho, Showa-ku, Nagoya, 466 Japan). *Gastroenterol. Jpn.* 12(1):36-43; 1977.

5666 SEGMENTAL OBSTRUCTING ACUTE JEJUNITIS IN A CHILD. (Eng.) Hirschenberger, M.; Rosental, E.; Thaler, M. M. (Div. Gastroenterology, Univ. California, San Francisco, CA). *Gastroenterology* 73(1):166-169; 1977.

5667 RETROGRADE PROLAPSE OF THE ILEOCECAL VALVE. (Eng.) Hatten, H. P., Jr.; Mostowycz, L.; Hagihara, P. F. (Veterans Admin. Hosp., Lexington, KY 40507). *Am. J. Roentgenol.* 128(5):755-757; 1977.

5668 MALIGNANT DUODENOCOLIC FISTULAS. (Eng.) Welch, J. P.; Warshaw, A. L. (Hartford Hosp., 85 Jefferson St., Hartford, CT 06106). *Am. J. Surg.* 133(6):658-661; 1977.

5669 A COMMUNITY-WIDE EXPERIENCE WITH JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Garrison, R. N.; Waterman, N. G.; Sanders, G. B.; Abrams, B. (Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Am. J. Surg.* 133(6):675-681; 1977.

5670 BILE ACID DECONJUGATION IN INTESTINAL OBSTRUCTION STUDIED BY BREATH TEST. (Eng.) Fukushima, T.; Ishiguro, N.; Tsujinaka, Y.; Yamazaki, R.; Tsuchiya, S. (Second Dept. Surgery, Yokohama City Univ., Yokohama, Japan). *Jpn. J. Surg.* 7(2):73-81; 1977.

5671 INTUSSUSCEPTION IN INFANTS AND CHILDREN IN JAMAICA. (Eng.) El Shafie, M.; Jones, M. R.; Shapiro, R. (Medical Coll. Ohio, Toledo, OH). *Z. Kinderchir. Grenzgeb.* 20(2):142-148; 1977.

5672 THE SURGICAL MANAGEMENT OF PATIENTS WITH MORBID OBESITY. (Eng.) Scott, H. W. (Vanderbilt Univ. Medical Center, Nashville, TN). *J. R. Coll. Surg. Edinb.* 22(4):241-254; 1977.

5673 DRUG ABSORPTION AND HEPATIC DRUG METABOLISM IN PATIENTS WITH DIFFERENT TYPES OF INTESTINAL SHUNT OPERATIONS FOR OBESITY. A STUDY WITH PHENAZONE. (Eng.) Andreasen, P. B.; Dano, P.; Kirk, H.; Griesen, G. (Rigshospitalet, 9 Blegdamsvej, DK-2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 12(5):531-535; 1977.

5674 SCLEROSIS OF THE INTESTINAL TRACT WITH SEVERE MALABSORPTION. (Eng.) Nutzenadel, W.; Fahr, K.; Daum, R.; Herrmann, R. (Zentrum fur Kinderheilkunde, Im Neuenheimer Feld 150, D-6900 Heidelberg, W. Germany). *Eur. J. Pediatr.* 125(4):285-290; 1977.

5675 USE OF HYPERBARIC OXYGEN IN PARALYTIC ILEUS. (Eng.) Loder, R. E. (Peterborough District Hosp., Peterborough PE3 6DA, England). *Br. Med. J.* 1(6074):1448-1449; 1977.

5676 ISOLATED SMALL BOWEL OBSTRUCTION AS THE PRESENTING FEATURE OF COLONIC DISEASE. (Eng.) Welch, J. P.; Warshaw, A. L. (Massachusetts General Hosp., Boston, MA 02114). *Arch. Surg.* 112(7):809-812; 1977.

5677 SURGICAL TREATMENT OF MORBID OBESITY: THREE YEARS OF EXPERIENCE. (Eng.) Bridges, R. M.; Daniel, G. G. (Minden Medical Center, Minden, LA). *Abdom. Surg.* 19(3):69-73; 1977.

5678 INTERNAL RETROVESICAL HERNIA PRODUCING INTESTINAL OBSTRUCTION: REPORT OF A CASE. (Eng.) Aldrete, J. S.; Herrera, L. O. (Dept. Surgery, Univ. Alabama at Birmingham, University Station, Birmingham, AL 35294). *Arch. Surg.* 112(7):853; 1977.

5679 MEDITERRANEAN LYMPHOMA--AN UNUSUAL COURSE. (Eng.) Lessing, J. B.; Merhav, A.; Baratz, M. (Rokach Municipal Government Hosp., Balfor St., Tel Aviv, Israel). *Am. J. Med. Sci.* 273(2):221-225; 1977.

5680 RADIONUCLIDE DEMONSTRATION OF SMALL-BOWEL ANATOMY IN THE AFFERENT-LOOP SYNDROME: CASE REPORT. (Eng.) Thomas, J. L.; Cowan, R. J.; Maynard, C. D.; Wu, W. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *J. Nucl. Med.* 18(9):896-897; 1977.

5681 ABNORMAL LIPID ACCUMULATION WITHIN THE SMALL INTESTINAL MUCOSA OF CHILDREN WITH JUVENILE-ONSET DIABETES MELLITUS. (Eng.) Bobo, R. C.; Partin, J. C.; Schubert, W. K.; Saalfeld, K. (Children's Hosp. Res. Foundation, Elland and Bethesda Ave., Cincinnati, OH 45229). *Am. J. Dis. Child.* 131(9):962-969; 1977.

5682 INTESTINAL ANGINA: REPORT ON TWO OPERATED CASES. (Eng.) Solheim, K.; Rosseland, A.; Lund, B. L. (Telemark County Hosp., Skien, Norway). *Scand. J. Thorac. Cardiovasc. Surg.* 11(2):141-150; 1977.

5683 INTESTINAL HEMANGIOMA WITH INTUSSUSCEPTION IN INFANCY. (Eng.) Boulis, M. N.; Karp, S.; Rubinstein, M. F. (2010 New Albany Rd., Cinaminson, NJ). *J. Med. Soc. N.J.* 74(9):775-776; 1977.

5684 ADULT INTUSSUSCEPTION IN GLASGOW--1968-74. (Eng.) Murdoch, R. W. G.; Wallace, J. R. (Victoria Infirmary, Glasgow, Scotland). *Br. J. Surg.* 64(9):679-680; 1977.

5685 WANDERINGS IN THE SMALL INTESTINE. (Eng.) McCarthy, C. F. (Regional Hosp., Galway, Ireland). *Ir. J. Med. Sci.* 146(7):221-225; 1977.

5686 IMMUNOGLOBULIN DEFICIENCY DISEASES OF THE INTESTINE. (Eng.) Davis, T. J.; Berk, R. N. (Parkland Memorial Hosp., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastrointest. Radiol.* 2(1):7-11; 1977.

5687 A BLEEDING MECKEL'S DIVERTICULUM DIAGNOSED BY ARTERIOGRAPHY. (Eng.) Takeda, I.; Nakano, S.; Kitamura, K.; Watahiki, H.; Iinuma, Y.; Takenaka, M. (Ogaki Municipal Hosp., 4-86 Minaminokawa-machi, Ogaki City, Gifu, 503 Japan). *Gastroenterol. Jpn.* 12(1):76-79; 1977.

5688 ON A THERAPEUTIC TARGET POINT FOR THE NON-OPERATIVE TREATMENT OF INTESTINAL OBSTRUCTION: A CLINICAL AND EXPERIMENTAL STUDY. (Eng.) Shikata, J. I.; Matsuo, Y. (Teikyo Univ. Sch. Medicine, 11-1, Kaga 2-chome, Itabashi-ku, Tokyo, 173 Japan). *Gastroenterol. Jpn.* 12(1):7-12; 1977.

5689 OXALOSIS AND CHRONIC RENAL FAILURE AFTER INTESTINAL BYPASS. (Eng.) Gelbart, D. R.; Brewer, L. L.; Fajardo, L. F.; Weinstein, A. B. (Stanford Medical Sch., 300 Pasteur Dr., Stanford, CA 94305). *Arch. Intern. Med.* 137(2):239-243; 1977.

5690 SEROMUCOIDS IN CHRONIC BOWEL DISORDERS OF TROPICS. (Eng.) Satwik, A.; Sarin, G. S.; Misra, R. C. (Maulana Azad Medical Coll., New Delhi-110002, India). *J. Trop. Med. Hyg.* 80(2):40-42; 1977.

5691 STRANGULATED PARA-ILEOSTOMY HERNIA. (Eng. Cuthbertson, A. M.; Collins, J. P. (5 Coo-nil Crescent, Malvern, Victoria 3144, Australia). *Aust. N.Z. J. Surg.* 47(1):86-87; 1977.

5692 SMALL BOWEL LENGTH IN HYPERLIPIDEMIA AND MASSIVE OBESITY. (Eng.) Guzman, I. J.; Fitch, L. L.; Varco, R. L.; Buchwald, H. (Univ. Minnesota Hosp., Box 290, Minneapolis, MN 55455). *Am. J. Clin. Nutr.* 30(7):1006-1008; 1977.

5693 GASTRIC AND JEJUNOILEAL BYPASS: A COMPAR SON IN THE TREATMENT OF MORBID OBESITY. (Eng.) Alden, J. F. (350 St. Peter St., St. Paul, MN 55102). *Arch. Surg.* 112(7):799-806; 1977.

5694 ACUTE NECROTIZING ENTEROCOLITIS IN NEONATES. (Eng.) Roty, A. R., Jr.; Kilway, J. B.; Brown, A. L., II. (504 Bronson Medical Cente Kalamazoo, MI 49006). *Am. Surg.* 43(6):392-394; 197

5695 NECROTIZING ENTEROCOLITIS. (Eng.) Cummins, G. E. (Royal Alexandra Hosp. for Children, Camperdown, New South Wales 2050, Australia). *Med. J. Aust.* 1(11):376-378; 1977.

5696 NEONATAL NECROTIZING ENTEROCOLITIS: 1. CLINICAL ASPECTS. (Eng.) Yu, V. Y. H.; Tudehope, D. I.; Gill, G. J. (Queen Victoria Memori Hosp., 172 Lonsdale St., Melbourne, Victoria 3000, Australia). *Med. J. Aust.* 64(19):685-688; 1977.

5697 NEONATAL NECROTIZING ENTEROCOLITIS: 2. PERINATAL RISK FACTORS. (Eng.) Yu, V. Y H.; Tudehope, D. I. (Queen Victoria Memorial Hosp., 172 Lonsdale St., Melbourne, Victoria 3000, Australia). *Med. J. Aust.* 64(19):688-693; 1977.

5698 ACUTE ISCHAEMIC ENTERITIS IN GOA. (Eng.) Gupta, S. D.; D'Silva, V.; Salelkar, A. V.; Reys, M. (Goa Medical Coll., Panaji, Goa, India *Br. J. Surg.* 64(6):420-423; 1977.

See also, 5301, 5322, 5467, 5484, 5486, 5487, 5508, 5528, 5530, 5537, 5544, 5592, 5621, 5703, 5704, 5722, 5760, 5774, 5790, 5931, 5939, 5950, 5955, 5957, 5963, 5964, 5971, 5975, 5986.

Malabsorption

5699 RELATIVE ENTEROTOXIGENICITY OF COLIFORM BACTERIA. (Eng.) Klipstein, F. A.; Engert, R. F.; Short, H. B. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *J. Infect. Dis.* 136(2):205-215; 1977.

The enterotoxigenicity of 12 strains of coliform bacteria (*Enterobacter cloacae, Klebsiella pneumoniae,* and *Escherichia coli*) isolated from the gastrointestinal (GI) tract of persons with either acute diarrhea or tropical sprue was determined; the enterotoxigenicity of 13 strains of the same species isolated from urine (GU) cultures from other subjects was also studied. Fractions of heat-labile (LT) and heat-stable (ST) toxins of each strain were separated by ultrafiltration, and the effect of graded concentrations of these fractions (100 μg-10 pg/ml) on water transport was assessed by *in vivo* perfusion in the rat jejunum. Enterotoxigenic activity was defined as inducement of net secretion of water. All 12 GI strains and 6 of 13 GU strains elaborated enterotoxins, but there was a million-fold quantitative difference in the potency of the toxins produced. All GI strains produced one or both forms of toxin, which had a minimal effective concentration of as low as 0.1-10 ng/ml, whereas the GU strains produced toxins of weak or, rarely, of intermediate potency. The million-fold variation in potencies of toxins elaborated by strains of Enterobacteriaceae isolated from different sources does not appear to be related either to variations in the potency of different batch preparations or to inconsistencies in the assay system itself.

5700 MUCOSAL ENTEROKINASE ACTIVITY IN PANCREATIC INSUFFICIENCY AND CELIAC DISEASE. (Eng.) Morin, C. L.; van Caillie, M.; Roy, C. C.; Lasalle, R. (Sainte Justine Hosp., 3175 St. Catherine Rd., Montreal H3T 1C5, Quebec, Canada). *Pediatrics* 60(1): 114-116; 1977.

Jejunal biopsy specimens obtained from 13 children with cystic fibrosis (CF), 13 with untreated celiac disease (CD), 3 with congenital exocrine pancreatic hypoplasia (CEPH), and 10 controls were examined histologically, and homogenates were used for the measurement of enterokinase and sucrase activities. The histologic appearance of the mucosa was normal in all patients except those with CD. Sucrase activity was significantly reduced ($p<0.05$) in children with CD (3.3 ± 1.1 U/g mucosa) as compared with those with CF (10.9 ± 1.4 U/g), CEPH (9.6 ± 0.8 U/g), and controls (10.5 ± 0.7 U/g). Enterokinase activity in children with pancreatic insufficiency (7.4 ± 0.8 U/g mucosal protein in CF and 9.9 ± 0.8 in CEPH) was higher ($p<0.05$) than that of control subjects (4.4 ± 0.2 U/g). Patients with CD had a slightly increased mean value at 5.4 U, but this was not significant. It appears that pancreatic enzymes play a large role in the turnover of enzymes in the brush border membrane and that the observed increase of mucosal enterokinase activity is probably explained by a reduced degradation in patients with exocrine pancreatic deficiency.

5701 MORE EVIDENCE FOR THE RECESSIVE INHERITANCE OF SELECTIVE ADULT TYPE LACTOSE MALABSORPTION. (Eng.) Sahi, T.; Launiala, K. (Dept. Public Health Science, Univ. Helsinki, Haartmaninkatu 3, 00290 Helsinki 29, Finland). *Gastroenterology* 73(2): 231-232; 1977.

The transition from the state of lactose absorption to that of lactose malabsorption was documented in two boys who were at risk of selective adult-type lactose malabsorption (SLM) because the parents of both boys had the disorder. The two boys were among the 16 children of four families in which both parents had SLM; 12 of the children already had symptoms of lactose malabsorption. At the ages of 14 and 9 yr, resp., the boys had normal lactose absorption. The boys were examined 3 yr and 7 months and 4 yr and 5 months later, resp., and both were shown to have lactose malabsorption; the criteria included a maximum rise in blood glucose concentration of less than 20 mg/100 ml and a maximum rise in blood galactose concentration of 5 mg/100 ml or less. One boy had not recognized milk intolerance, although he drank four to five glasses of milk/day. The period of documented transition averaged less than 4 yr. These manifestations clearly strengthen the hypothesis that SLM is a genetically determined disorder, the mode of inheritance indicating a single autosomal recessive gene.

5702 LACTOSE MALABSORPTION AND BONE MINERAL CONTENT. (Eng.) Alhava, E. M.; Jussila, J.; Karjalaninen, P.; Vuojolahti, P. (Univ. Central Hosp. Kuopio, Kuopio, Finland). *Acta Med. Scand.* 201(4):281-283; 1977.

Bone mineral density was measured by ^{241}Am gamma ray attenuation in 34 patients with lactose malabsorption and 34 controls with normal lactose absorption to determine whether lactose malabsorption leads to osteoporosis. The values in these subjects were compared with previously established normal values. The mineral densities of the distal radius did not differ significantly from normal in either the patients with malabsorption or those with normal absorption. At the cortical radius and ulna there were some statistically significant differences, both the patients with lactose malabsorption and the controls apparently having more mineral than the previously established normal values. The mean serum calcium, phosphorus, alkaline phosphatase, and total protein concentrations of the patients with malabsorption and controls did not differ significantly. Seventy percent of the patients with lactose malabsorption did not drink milk. Only two consumed more than one glass of milk per day. The average milk consumption of the controls was two glasses per day. Although lactose malabsorption leads to reduced milk consumption and calcium intake, it does not cause osteoporosis.

5703 INTESTINAL OXALATE ABSORPTION. I. ABSORPTION IN VITRO. (Eng.) Caspary, W. F. (Dept. Medicine, Univ. Gottingen, Humboldtalle 1, D-3400 Gottingen, W. Germany). *Res. Exp. Med.* 171(1):13-24; 1977.

The mechanism responsible for hyperabsorption of oxalate in patients with ileal resection was investigated by studying the intestinal transport of oxalic acid by an *in vitro* technique in rat intestine. Oxalic acid was absorbed by a mechanism of simple passive diffusion. The rate of absorption decreased from the colon to the duodenum (colon>ileum>jejunum>duodenum). Bile acids (glycocholic acid, 10^{-2} M; taurocholic acid, 10^{-2} M; deoxycholic acid, 5×10^{-3} M) enhanced oxalic acid absorption in the large and small intestine, and the extracellular space was increased by glycocholic acid and chenodeoxycholic acid (10^{-2} M). Calcium (10^{-2} M), however, markedly decreased mucosal-serosal transport of oxalic acid. Cholestyramine (20 mg/ml), known to reduce oxalate excretion in hyperoxaluria associated with ileal resection, did not directly affect absorption of oxalic acid but decreased the enhanced absorption of oxalic acid induced by bile acids. The results suggest that the beneficial therapeutic effect of cholestyramine in hyperoxaluria is mediated by its bile acid binding activity rather than by direct binding of oxalic acid.

5704 HYPEROXALURIA CORRELATES WITH FAT MALABSORPTION IN PATIENTS WITH SPRUE. (Eng.) McDonald, G. B.; Earnest, D. L.; Admirand, W. H. (Veterans Admin. Hosp., Medical Service, 4435 Beacon Ave. South, Seattle, WA 98108). *Gut* 18(7): 561-566; 1977.

The hypothesis that enhanced dietary oxalate absorption in patients with severe ileal dysfunction is associated primarily with fat malabsorption was tested in four patients with sprue and in two patients with dermatitis herpetiformis and sprue-like jejunal histology. Hyperoxaluria was present in all patients with sprue when fat malabsorption was severe. Urinary oxalate excretion decreased in two of the three patients with celiac sprue when their fat malabsorption had improved after 3 months of dietary gluten restriction. Neither patient with dermatitis herpetiformis and sprue had steatorrhea. In these latter patients, urinary oxalate excretion was always within normal limits. A significant positive linear relationship ($y=28.25 + 4.84x$; $r=0.82$; $p<0.01$) was demonstrated between fecal fat and urinary oxalate excretion. The results support the concept that severe malabsorption of dietary fat plays a primary causative role in enteric hyperoxaluria.

5705 CHARACTERISTICS OF THE IMMUNE RESPONSE IN A PATIENT WITH WHIPPLE'S DISEASE. (Eng.) Clancy, R.; Muckle, T. J.; de Jesus, D.; Stevens, D. (Royal Prince Alfred Hosp., Camperdown, NSW 2050, Australia). *Aust. N.Z. J. Med.* 7(3):294-298; 1977.

The effect of antibiotic therapy on the immune status of a patient with Whipple's disease was investigated, and the specific immune response cell wall-deficient form of an alpha-hemolytic streptococcus (αHS) isolated from this patient was studied. Thymus-derived lymphocyte numbers were reduced, and cutaneous anergy was present. Auto antibodies directed against smooth muscle and mitochondria were detected. These abnormal parameters became normal following therapy with tetracycline (1 g/day). The specific immune response to the αHS was characterized by IgA antibody and lymphocyte sensitization. The latter was detected as antigen-induced lymphocyte stimulation and antigen-induced leukocyte inhibition factor (LIF) production. Antibiotic therapy was associated with a fall in antibody titer and reduced LIF production. No defect in neutrophil function was found. These results are consistent with the postulates that immunological abnormalities in Whipple's disease are secondary to infection and that the primary abnormality is an unusual pathogenic bacterium.

5706 DISACCHARIDE CONSUMPTION AND MALABSORPTION IN CANADIAN INDIANS. (Eng.) Ellestad-Sayed, J. J.; Haworth, J. C. (Dept. Pediatrics, Univ. Manitoba, 770 Bannatyne Ave., Winnipeg R3E 0W3, Canada). *Am. J. Clin. Nutr.* 30(5): 698-703; 1977.

5707 INDIVIDUAL SENSITIVITY TO LACTOSE IN LACTOSE MALABSORPTION. (Eng.) Gudmand-Hoyer, E.; Simony, K. (Copenhagen County Hosp. in Gentofte, DK-2900 Hellerup, Denmark). *Am. J. Dig. Dis.* 22(3):177-181; 1977.

See also, 5510, 5556, 5612, 5648, 5657, 5669, 5674, 5685, 5690, 5716, 5783, 5900, 5944.

5708 BENIGN PNEUMOPERITONEUM AFTER FIBEROPTIC COLONOSCOPY: A PROSPECTIVE STUDY OF 100 PATIENTS. (Eng.) Ecker, M. D.; Goldstein, M.; Hoexter, B.; Hyman, R. A.; Naidich, J. B.; Stein, H. L. (Veterans Admin. Hosp., West Haven, CT 06516). *Gastroenterology* 73(2):226-230; 1977.

The frequency of asymptomatic colonic perforation was investigated in 100 consecutive unselected patients undergoing both diagnostic and therapeutic fiberoptic colonoscopy. All patients received frontal chest and supine and erect abdominal radiographs before, immediately after, and 24 hr after colonoscopy. Blood counts, serum amylase, creatine phosphokinase, LDH, SGPT, and SGOT were also determined. There was only one positive case of pneumoperitoneum. The patient was a 37-yr-old woman in whom the colonoscope could not be passed above 50 cm despite manipulation and air insufflation, due to fixation and angulation of the colon. The mucosa up to this level was hyperemic and friable, and multiple small erosions were noted. The patient was completely asymptomatic after the procedure, and her vital signs were stable. Approximately 8 hr later, she developed a fever with minimal midabdominal discomfort. She became afebrile and asymptomatic after complete restriction of p.o. intake and administration of i.v. fluids and antibiotics. The amount of free intraperitoneal air decreased over the next 72 hr. There was no significant change in either the blood count or enzyme levels when the pre- and postcolonoscopic values were compared. This study suggests that the incidence of colonic perforation after fiberoptic colonoscopy is low and may occur with minimal or no clinical evidence suggesting perforation.

5709 EFFECT OF LOPERAMIDE ON FECAL OUTPUT AND COMPOSITION IN WELL-ESTABLISHED ILEOSTOMY AND ILEORECTAL ANASTOMOSIS. (Eng.) Tytgat, G. N.; Huibregtse, K.; Dagevos, J.; Van Den Ende, A. (Wilhelmina Gasthuis, Amsterdam, Netherlands). *Am. J. Dig. Dis.* 22(8):669-676; 1977.

The quantitative effects of loperamide on several parameters of fecal composition and output were assessed in seven patients with an ileorectal anastomosis and in seven patients with an ileostomy. Loperamide (two 2-mg capsules, t.i.d.) or placebo was administered in a double-blind study in two randomly assigned, successive 7-day periods. Loperamide significantly decreased the daily volume (-29.2%), wet weight (-29.2%), water content (-5.5%), and fecal excretion rate (-28%) and significantly increased the bulk density (+40%) and viscosity (+285%) of the fecal collections. Electrolyte loss was significantly diminished with loperamide: daily sodium and chloride outputs were significantly decreased (-42.5% and -31%, resp.) and daily calcium, phosphate, and potassium outputs were slightly decreased. Sodium concentration significantly decreased (-12.4%), while potassium and calcium concentrations significantly increased (+12.5% and +19.2%, resp.). The phosphate concentrations increased slightly, and the chloride concentrations slightly decreased. The sodium/potassium ratio was significantly reduced (-45.5%). No effect on fecal dry weight or on lipid or bile acid outputs was observed. The fecal potassium concentration and output were significantly higher, and the sodium/potassium ratio was significantly lower in patients with an ileorectal anastomosis than in patients with ileostomy. This group also showed a tendency to slightly lower fecal volume, wet weight, water content, fecal excretion rate, sodium concentration, and output. The therapeutic efficacy of loperamide was comparable in both patient groups. The results were rated "excellent" in three patients, "good" in seven, "questionable" in three, and "poor" in one. No adverse effects attributable to loperamide were observed. All patients reported feeling better during treatment and preferred the active drug period to the placebo period.

5710 ACTINOMYCOSIS OF THE COLON. (Ita.) Campanelli, A.; De Simone, G.; Negrone, G.; Renda, F.; Rispoli, G.; Vetrano, G. (Regionale Ospedaliero Generale, Ospedali Riuniti di Napoli, Divisione Chirurgia D'Urgenza dell'Ospedale A. Cardarelli, Naples, Italy). *Rass. Int. Clin. Ter.* 57(5):310-316; 1977.

A case study of a 60-yr-old woman with actinomycosis of the colon is presented. The patient was treated by surgical intervention. Diagnosis of actinomycosis of the colon was made by histological examination. Treatment consisted of 10^6 U of penicillin G/day for 2 weeks. Two susbequently repeated acute infectious episodes, also caused by actinomycetes, were also treated with penicillin G. The patient has recovered and is now in good health. It is concluded that although actinomycosis of the colon is a rare disease, the condition should be considered when making differential diagnoses of diseases of the colon.

5711 GASTROINTESTINAL CANCER--COLON (SURGERY-RADIOTHERAPY): THE ROLE OF RADIATION THERAPY IN THE MANAGEMENT OF RECTOSIGMOID CANCER. (Eng.) Johnson, R. J. R. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *Cancer* 40(1):595-603; 1977.

The epidemiology, incidence, etiology, screening procedures, surgery, and the role of radiation therapy in the management of colorectal cancer are reviewed. During the last decade, the generally accepted treatment for Duke's B and C carcinoma of the colon has been surgery followed by chemotherapy. Gross survival statistics and a large randomized trial show that 5-fluorouracil therapy has not increased survival. No drug or combination of drugs has as yet lengthened survival when used in the adjuvant situation. The improvement in regional tumor control and a decrease in distal metastases reported in an unrandomized study in 1956 has not been reflected in the gross survival statistics, despite the fact that a large percentage of surgeons has adopted this superior surgical technique. The widespread use of carcinoembryonic antigen does not appear to have affected the survival figures, probably because large volumes of tumor associated with incurable disease are required before the test becomes positive. Adjuvant radiotherapy has been used in a very small number of institutions despite the promise suggested for this modality by radiotherapy results published in the 1950's. The therapeutic gain, which may be expected to be shown in the current randomized adjuvant trials utilizing preoperative or postoperative radiotherapy, should not be expected to exceed 10-20%, since radiotherapy may only decrease regional tumor recurrence; however, preoperative radiation may also decrease the metastasis rate. Large changes in survival of advanced rectal cancer can be expected only when chemotherapeutic agents capable of permanently controlling microscopic metastatic disease can be used in conjunction with radiation to control regional disease. Both surgical electrocoagulation and intracavitary radiotherapy have produced a high cure rate in selective Duke's A carcinoma of the rectum. Radiation therapy should be considered as an alternative primary modality whenever surgery is refused or contraindicated.

5712 ELECTIVE POSTOPERATIVE RADIOTHERAPY FOR LOCALLY ADVANCED COLORECTAL CANCER: A PRELIMINARY REPORT.

(Eng.) Turner, S. S.; Vieira, E. F.; Ager, P. J. Alpert, S.; Efron, G.; Ragins, H.; *et al.* (Long Island Coll. Hosp., Brooklyn, NY). *Cancer* 40(1):105-108; 1977.

The role of elective postoperative irradiation was studied in patients with locally advanced colorectal carcinoma. From October 1972 to December 1975, 40 patients at high risk for local recurrence (B_2 and C) received postoperative radiotherapy. Lesions that were located in the rectum and in the rectosigmoid and low sigmoid colon were given 4,600 rads in 4.5 weeks through an inverted T-shaped field that encompassed the pelvic and paraortic nodes. Patients with tumors located above mid-sigmoid were treated to the entire abdominal cavity by the moving strip technique. Of 19 patients with rectal and rectosigmoid lesions, 14 are alive without evidence of disease. Two had local recurrences in the treated area. Of 21 patients with lesions above the mid-sigmoid, 4 have failed locally, while 11 are alive without evidence of disease. One of these 40 patients died of radiation enteritis. Although the follow-up period is short, the results suggest that a moderate dose of radiation may prevent local recurrence in patients with locally advanced colorectal cancer.

5713 CANCER MARKERS IN PATIENTS RECEIVING CHEMOTHERAPY FOR COLORECTAL CANCER: A PRELIMINARY REPORT.

(Eng.) Bullen, B. R.; Cooper, E. H.; Turner, R.; Neville, A. M.; Giles, G. R.; Hall, R. (St. James Univ. Teaching Hosp., Leeds, England). *Med. Pediatr. Oncol.* 3(3):289-300; 1977.

Carcinoembryonic antigen (CEA), hepatic function marker enzymes, and four acute phase reactant proteins (haptoglobin, α_1-antitrypsin, α_1-acid glycoprotein, and prealbumin) were determined as a routine monitoring system in patients with colorectal cancer receiving chemotherapy. In 18 patients with advanced lesions who survived at least 3 months of treatment, the markers predicted progression in 92% of 25 incidents of progression; the mean lead time was 2.8 months. A rising CEA was only present in 28%, but in these patients, it gave a mean lead time of 4 months. Among 14 patients with minimal residual disease, progression to clinically detectable disease has occurred in 9. In these cases, the markers predicted progression, wit a mean lead time of 6 months; in a further six patients, the markers have indicated progression, but as yet the disease is not detectable, the mean lead time being at least 8.6 months. CEA and the liver enzyme markers are the most sensitive indicators of progression of the minimal residual disease group.

5714 CELLULAR IMMUNITY IN PATIENTS WITH COLORECTAL ADENOCARCINOMA MEASURED BY AUTOLOGOUS LEUKOCYTE MIGRATION INHIBITION.

(Eng.) Elias, E. G.; Elias, L. L.; Didolkar, M. S.; Hebel, J. R. (Univ. Maryland Hosp., 22 S. Greene St., Baltimore, MD 21201). *Cancer* 40(2):687-692; 1977.

Tumor-specific cell-mediated immunity was studied *in vitro*, using the leukocyte migration inhibition test (LMT) in 62 patients with various stages of colorectal adenocarcinoma. These patients underwen exploratory laparotomy for curative or palliative resections and were staged surgically and pathologi ally. Autologous tumor and mucosa were obtained from their surgical specimens, and its homogenates were used for autologous LMT initially, i.e., on the day of surgery, and stored for the follow-up studies utilizing freshly obtained autologous peripheral blood. Patients with localized or regional disease were initially hypersensitized to their tumors when compared with those with disseminated disease. However, the follow-up studies expressed loss of such hypersensitivity. This could explain a possible mechanism for the development of metastasis and might provide an "escape" mechanism for the tumor immune response in the host on the cellular level. These findings might reflect on immunotherapy in patients with regional or local disease after their curative surgery. For passive immunization, the lymphocytes should be obtained from these patients prior to surgery. Active or passive immunization could then be administered in the postoperative period and monitored by LMT.

5715 CEA-TEST ON COLONOSCOPIC LAVAGE FLUID AS A SUBSIDIARY TECHNIQUE IN EVALUATING PRECANCEROUS COLONIC CONDITIONS.

(Eng.) Rossini, F. P.; Ferrari, A.; Droetto, G. (Ospedale San Giovann Molinette, Corso Bramante, 88, 10125 Torino, Italy *Rend. Gastroenterol.* 9(1):28-31; 1977.

The value of carcinoembryonic antigen (CEA) determination in fluid collected by means of colonic lavage during colonoscopy was studied in 54 patient with a normal large bowel, 87 with colonic carcinom

96 with ulcerative colitis, 18 with Crohn's disease of the colon, and 21 with polyposis. The CEA levels in the lavage fluid of the normal subjects were less than 20 ng/ml in all cases. The mean CEA level in the patients with carcinoma was 195 ng/ml, and levels of 20 ng/ml or lower were found in only 22 carcinoma patients. In the 18 patients with ulcerative colitis for less than 5 yr, the mean CEA level was 19 ng/ml, while that in patients with disease of longer duration, the level was 150 ng/ml. The level in patients with Crohn's disease for less than 5 yr was 15 ng/ml, while that in patients with disease of longer duration was 150 ng/ml. In 18 patients with uncomplicated polyposis, the mean level was 8.5 ng/ml, while that in the 3 patients in whom familial polyposis progressed to carcinoma was 220 ng/ml. The measurement of CEA in colonic fluids seems to be useful in monitoring the course of diseases with a known potential for malignancy and in the diagnosis of large bowel cancer.

5716 COLITIS, PERSISTENT DIARRHEA, AND SOY PROTEIN INTOLERANCE.

(Eng.) Halpin, T. C.; Byrne, W. J.; Ament, M. E. (Univ. California at Los Angeles Center for the Health Sciences, Los Angeles, CA 90024). *J. Pediatr.* 91(3):404-407; 1977.

Four infants with vomiting, diarrhea, hematochezia, and weight loss of more than 10% were studied for the presence of suspected soy protein intolerance. Laboratory abnormalities included anemia (3 patients), acidosis (3), hypoalbuminemia (3), hypernatremia (1), hyponatremia (3), and mild eosinophilia (2). Symptoms developed between 3 hr and 5 days after systematic testing with increasing volumes of soy formula. After challenge with soy protein formula, proctosigmoidoscopy and rectal biopsy were performed within 24 hr of developing stools with gross blood. Proctosigmoidoscopy showed both spontaneous and induced friability and loss of vascular pattern in mucosa. Rectal biopsy showed acute colitis with crypt abscesses, depletion of mucus from rectal glands, and polymorphonuclear leukocytes within the lamina propria. Soy protein-induced colitis should be suspected in infants presenting with persistent bloody diarrhea after being fed soy formula.

5717 GLUCOSAMINE SYNTHETASE ACTIVITY OF THE COLONIC MUCOSA IN MEMBRANOUS COLITIS.

(Eng.) Goodman, M. J.; Kent, P. W.; Truelove, S. C. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gut* 18(3):229-231; 1977.

Glucosamine synthetase activity was measured in rectal biopsies of four patients with membranous colitis. Three patients had received antibiotics prior to the onset of the disease. A rectal biopsy was taken and assayed for the enzyme at the time of diagnosis and after a 5-day i.v. course of 0-60 mg of prednisolone-21-phosphate daily. The patients then received p.o. prednisolone and prednisolone retention enemas for a further 6 weeks, and biopsies were taken on the 10th day and at weeks to 3 months. All patients showed complete clinical and sigmoidoscopic recovery. In comparison to a previously determined normal glucosamine synthetase level (i.e., 13.77 ± 3.97 U), the peak levels in each patient were 36.0, 27.0, 31.7, and 20.5 U, resp.; the first two peak levels occurred at the time of diagnosis, and the remaining two levels occurred within 10 days of beginning treatment. The first three patients showed a fall in enzyme levels after the peak was reached. These high levels may be related to the mucous hypersecretion typical of membranous colitis, but it seems more likely that they represent the healing of the mucosa.

5718 BACTERIOLOGICAL STUDIES IN A PATIENT WITH ANTIBIOTIC-ASSOCIATED PSEUDOMEMBRANOUS COLITIS.

(Eng.) Allen, S. D.; Dunn, G. D.; Page, D. L.; Wilson, F. A. (Center for Disease Control, Enterobacteriology Branch, 1-B341, Atlanta, GA 30333). *Gastroenterology* 73(1):158-163; 1977.

Detailed aerobic and anaerobic bacteriological studies were carried out on the operative specimen from a patient with antibiotic-associated pseudomembranous colitis, and data are presented on the toxigenicity, tissue invasiveness, lethality for mice, and antibiotic susceptibility of the bacteria isolated. There were approximately 10^{11} facultatively anaerobic bacteria, but less than 10^{5} obligate anaerobes per gram of involved colonic tissue. Fourteen isolates of *Escherichia coli*, three isolates of *Pseudomonas aeruginosa*, and two isolates of *Streptococcus fecalis* were identified. All *E. coli* isolates were resistant to clindamycin, penicillin, and ampicillin, and *P. aeruginosa* was resistant to every antibiotic the patient had received (cefazolin, clindamycin, kanamycin, procaine penicillin, gentamycin, ampicillin, and chloramphenicol). *S. fecalis* was resistant to clindamycin, kanamycin, and gentamicin. Examinations of *E. coli* for heat-labile and heat-stable enterotoxins and tissue invasiveness were negative, and enterotoxin tests on the *P. aeruginosa* isolates were negative. Inoculation of mice with the bacterial isolates revealed no unusual pathogenicity. These findings suggest that antibiotic-associated colitis is associated with a marked loss in anaerobic colonic flora, but the colitis could not be explained by the presence of enterotoxins, tissue invasiveness, and pathogenicity of remaining microorganisms.

5719 PROPHYLACTIC SYSTEMIC ANTIBIOTICS IN COLORECTAL SURGERY.

(Eng.) Feathers, R. S.; Sagor, G. R.; Lewis, A. A. M.; Amirak, I. D.; Noone, P. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Lancet* 2(8027):4-8; 1977.

The prophylactic value of gentamicin combined with either lincomycin or metronidazole was investigated in 52 patients undergoing colorectal surgery. Gentamicin (1.6 mg/kg) was initially given every 8 hr i.m. or i.v., and then according to serum concentrations, to achieve a peak of between 5 and 10 μg/ml. Metronidazole was given as a 1-g suppository every 8 hr together with gentamicin; in cases of low anterior resection, it was given i.v. (500 mg). In 25 untreated controls, the sepsis rate was 48%, and one death was attributable to sepsis. There was only one case of sepsis (a superficial infection of the lower abdominal wound in a patient treated with gentamicin and metronidazole) in the treated group, and no deaths attributable to sepsis occurred. The combination of gentamicin and lincomycin was effective against sepsis, but pseudomembranous colitis developed in 2 of the 14 patients treated with this combination, one of these patients died. The gentamicin/metronidazole combination had no toxic side-effects. The results show that the combination of gentamicin and metronidazole is effective and safe in the prophylaxis of infection in colorectal surgery.

5720 COLONIC PROPULSION IN DIVERTICULAR DISEASE, IDIOPATHIC CONSTIPATION, AND THE IRRITABLE COLON SYNDROME.

(Eng.) Kirwan, W. O.; Smith, A. N. (Western General Hosp., Edinburgh, Scotland). *Scand. J. Gastroenterol.* 12(3):331-335; 1977.

Colonic intraluminal pressure and intestinal transit time were measured simultaneously to assess colonic motility indexes in 15 patients with uncomplicated diverticular disease, 4 patients with idiopathic constipation, and 7 with the irritable colon syndrome. The patients were also studied after the ingestion of bran to ascertain whether there was any preferential action on pressure or intestinal transit. The transit time in diverticular disease was increased (68 ± 14 hr) in comparison with transit time in normal subjects (23 ± 1 hr); after bran, this was reduced to 32 ± 6 hr ($p<0.05$). The transit time was prolonged in idiopathic constipation (93 ± 23 hr) and in the irritable colon syndrome (59 ± 18 hr); the effect of bran was more pronounced ($p<0.05$) in the constipated patients than in the patients with irritable colon (not significant). The mean transit times in the right colon, transverse colon, splenic flexure, and rectosigmoid of 12 diverticular disease patients were 25 ± 5, 24 ± 0, 26 ± 2, and 29 ± 4 hr, resp.; bran decreased these times significantly to 16 ± 2 hr ($p<0.0025$), 16 ± 2 hr ($p<0.0025$), 16 ± 2 hr ($p<0.0005$), and 18 ± 2 hr ($p<0.0025$), resp. A comparable time was taken in each zone for idiopathic constipation and for irritable colon; these were also reduced by bran, but to a lesser extent. In the 15 patients with diverticular disease, the basal colonic motility index was reduced from 1,848 ± 387 to 764 ± 214 ($p<0.0125$) by bran; the postprandial colonic motility index fell from 2,566 ± 415 to 1,771 ± 264 ($p<0.10$) after bran, and the prostigmine motility index fell from 5,298 ± 456 to 3,968 ± 511 ($p<0.05$); similar changes occurred in the irritable colon syndrome ($p<0.05$) but not in idiopathic constipation. The diverticular disease patients fell into two groups: 5 with an extremely long transit time and a moderately raised intraluminal pressure and 10 with a normal transit time and an extremely raised intraluminal pressure; this proportionality was maintained after bran. Up to certain physiologic levels of intraluminal pressure, an increase in pressure may serve to restrain the propulsion of the intraluminal contents; but when the pressure rises above this level, a further increase results in propulsion of the contents.

5721 HIRSCHSPRUNG'S DISEASE COMBINED WITH AGA
LIONOSIS AND SO-CALLED NEURONAL COLONIC
PLASIA (DYSGANGLIONOSIS COLICA).

(Ger.) Gullotta
F.; Straaten, G. (Institut Neuropathologie der Uni
versitat, 5300 Bonn-Venusberg, W. Germany). *Z. Ki
derchir.* 20(1):42-49; 1977.

Hirschsprung's disease with aganglionosis and neuronal colonic dysplasia was diagnosed in a 2-yr-ol
boy. At the age of 3.5 weeks, when Hirschsprung's
disease was suspected, a double transverse colosto
was inserted during toxic colitis with paralytic ileus. Initially, an end-to-end anastomosis between the proximal descending colon and the ampull
recti 4 cm above the anus was performed, followed by several bougienages of the deep anastomosis and widespread sphincter extension. Ten months later, resection of the double transverse anus and a portion of the transverse colon, termino-terminal large intestine anastomosis, and an appendectomy were performed. However, 3 weeks after surgery, colitis with diarrhea and fever developed. Colon contrast examination revealed pathological changes in the descending colon in the fold reliefs of the mucosa, atypical slow peristalsis and delayed empt
ing of the large intestine. Nutritional therapy w
Vivasorb for 50 days was started. Histological an
enzyme histochemical examination of the first rese
tion showed aganglionosis in the transverse colon with a high acetylcholinesterase activity in the m
cosa and submucosa. In the most distal part of th
resected intestinal section, individual ganglion cells or small plexus were present. The second op
ation showed that, in the proximal part, the myent
ic plexus had giant and hypertrophic multinucleate
ganglion cells similar to those described by Meyer
Ruge as neuronal dysplasia. These findings emphas
the complex malformation of this syndrome, which h
also been called "dysganglionosis colica." At the time of report the child was 5 yr old with normal development.

5722 ABOUT THE SO-CALLED ISCHEMIC-ULCERATIVE INNERWALL LESION OF THE BOWELS PROXIMAL TO INTESTINAL STENOSES.

(Ger.) Stellamor, K.; Redtenbacher, M.; Kosak, D.; Karobath, H. (Krankenanstalt Rudolfstiftung, Juchgasse 25, A-1030 Wien, Austria). *Fortschr. Roentgenstr.* 126(6):556-
559; 1977.

Ischemic ulcerative innerwall lesion of the bowel proximal to intestinal stenoses was diagnosed in seven patients, aged 6-87 yr old. Stenoses were caused by carcinoma of the colon in five cases and by chronic recurrent inflammatory changes due to diverticulitis of the sigmoid colon in two cases. Suture complications occurred in two patients afte
removal of stenoses. Four of the seven patients died; two died of total necrosis of the small or large intestines, and one patient each died of car

ioma of the thyroid gland or massive infarction.
ree patients survived without complications after
rgery. Pathological-anatomical findings revealed
ngitudinal and linearly situated ulcers with a
prinoid and purulent bases surrounded by edema-
us or rigid mucosa. Histologically, the ulcers
ached up to the muscularis propria and had a
prinoid/necrotic layer. The mucosal borders
owed inflammatory, pseudopolyp formations and
ojections. Thromboses were also noted in the
r, thin-walled venous vessels of the submucosa
the ulcer regions. The venous vessels were di-
ted and partially thrombosed. X-ray pictures were
aracterized by typical signs of an ulcerative
testinal wall process with high-grade stenoses.

23 IDIOPATHIC PROCTITIS. I. THE MORPHOLOGY OF PROXIMAL COLONIC MUCOSA AND ITS CLIN-
AL SIGNIFICANCE. (Eng.) Das, K. M.; Morecki, R.;
ir, P.; Berkowitz, J. M. (Albert Einstein Coll.
dicine, 1300 Morris Park Ave., Bronx, NY 10461).
. *J. Dig. Dis.* 22(6):524-528; 1977.

e extent of mucosal disease in 31 symptomatic
tients with idiopathic proctitis was evaluated
the microscopic examination of mucosal samples
tained during colonoscopy from different levels
the colon; the extent of mucosal lesions was then
rrelated with the clinical course. Mucosal biopsy
ecimens were considered to reflect inflammatory
sease when they showed at least two of the follow-
g abnormalities: (1) increased numbers of inflam-
tory cells in the lamina propria, (2) glandular
crosis, (3) crypt abscesses, (4) ulcerations, or
depletion of goblet cells and mucosal atrophy.
ong eight patients with newly diagnosed untreated
octitis with symptoms for less than 6 months,
ree showed involvement in portions of large in-
stine up to the transverse colon; in the remaining
ve, involvement was limited to the rectosigmoid
nction. Among nine patients with diagnosed idio-
thic proctitis for over 1 yr who had a long per-
l of remission (up to 12 months) prior to the
test episode, only one had involvement of the
ansverse colon. In contrast, 12 of 14 patients
h an established diagnosis of idiopathic proc-
tis for over 1 yr who were either having contin-
us symptoms or relapses at 2- to 4-month inter-
s had involvement up to the transverse colon.
tients in whom microscopic mucosal abnormalities
re limited to the most distal 20 cm of colon gen-
lly responded well to hydrocortisone enemas and
. sulfasalazine (2-3 g/day), but patients with
e extensive abnormalities responded poorly to
s regimen; some only partially responded after
e addition of p.o. corticosteroids. The results
ggest that idiopathic proctitis may comprise at
st two disease processes distinguished by the
tent and localization of microscopic mucosal
normalities.

24 VOLVULUS OF THE SIGMOID COLON. (Eng.)
Khoury, G. A.; Pickard, R.; Knight, M.
. George's Hosp., London, England). *Br. J. Surg.*
(8):587-589; 1977.

The clinical presentation and treatment of 31 consecutive patients with sigmoid volvulus were reviewed to improve treatment and prognosis. Nearly half of these patients had a history of mental illness, and one-third of all patients were chronically constipated. The main clinical features of abdominal pain and gross abdominal distension had been present for an average of 8 days before hospitalization. The presence of nonviable bowel was more difficult to establish than was the diagnosis of volvulus. A silent abdomen was the most valuable indication of the presence of gangrenous bowel. Conservative measures, including sigmoidoscopy and therapeutic barium enema, successfully reduced the volvulus in 6 of 11 cases. In 24 patients undergoing surgery (sigmoid colectomy and primary anastomosis, 6; Paul Mikulicz procedure, 10; Hartman's operation, 3), the procedure associated with the lowest mortality was sigmoid resection with end-to-end anastomosis. The overall mortality was 35%.

5725 RECTAL DUPLICATION PRESENTING AS PELVIC HERNIA IN A NEONATE: CASE REPORT. (Eng.) Khan, O.; Eckstein, H. B. (Hosp. Sick Children, Great Ormond St., London, WC1N 3JH, England). *Z. Kinderchir.* 21(1):95-98; 1977.

5726 AN IMPROVED SNARE FOR REMOVAL OF RECTOSIGMOID POLYPS. (Eng.) Bisordi, W.; Morgan, B.; Smith, D.; Kleinman, M. S. (Strong Memorial Hosp., Rochester, New York, NY 14642). *Am. J. Dig. Dis.* 22(7):650-655; 1977.

5727 SPONTANEOUS PERFORATION OF THE COLON: A POTENTIAL COMPLICATION OF CHRONIC RENAL FAILURE. Bartolomeo, R. S.; Calabrese, P. R.; Taubin, H. L. (114 State St., Bridgeport, CT 06604). *Am. J. Dig. Dis.* 22(7):656-657; 1977.

5728 EXTRAGENITAL MIXED HETEROLOGOUS TUMOR OF MULLERIAN TYPE ARISING IN THE CECAL PERITONEUM: REPORT OF A CASE. (Eng.) Weisz-Carrington, P.; Bigelow, B.; Schinella, R. A. (New York Univ. Medical Center, 550 First Ave., New York, NY 10016). *Dis. Colon Rectum* 20(4): 329-339; 1977.

5729 THE RESULTS OF SOAVE'S OPERATION FOR HIRSCHSPRUNG'S DISEASE. (Eng.) Baránowicz, B. (ul. Stawki 21 m. 30, 01040 Warsaw, Poland). *Z. Kinderchir.* 20(1):49-56; 1977.

5730 LOW RECTOVAGINAL FISTULAS: APPROACH AND TREATMENT. (Eng.) Russell, T. R.; Gallagher, D. M. (3838 California St., San Francisco, CA 94118). *Am. J. Surg.* 134(1):13-18; 1977.

5731 SEGMENTAL POLYPOID LIPOMATOSIS OF THE COLON. (Eng.) Danoff, D. M.; Nisenbaum, H. L.; Stewart, W. B.; Moore, R. C.; Clahassey, E.

B. (Albert Einstein Medical Center, York and Tabor Rd., Philadelphia, PA 19141). *Am. J. Roentgenol.* 128(5):858-860; 1977.

5732 THE GAY BOWEL SYNDROME: A REVIEW OF COLONIC AND REACTAL CONDITIONS IN 200 MALE HOMOSEXUALS. (Eng.) Sohn, N.; Robilotti, J. G., Jr. (20 E. 68th St., New York, NY 10021). *Am. J. Gastroenterol.* 67(5):478-484; 1977.

5733 THE PROGNOSIS FOLLOWING LARGE BOWEL OBSTRUCTION IN ADULTS. (Eng.) Taylor, I. (Univ. Liverpool, Liverpool, England). *Br. J. Clin. Pract.* 31(1/2/3):3-4; 1977.

5734 CARCINOMA OF THE COLON IN THE ADOLESCENT: A REPORT OF SURVIVAL AND AN ANALYSIS OF THE LITERATURE. (Eng.) Enker, W. E.; Paloyan, E.; Kirsner, J. B. (Box 441, 950 E. 59th St., Chicago, IL 60637). *Am. J. Surg.* 133(6):737-741; 1977.

5735 INTERMITTENT SIGMOID VOLVULUS IN THE YOUNGER AGE GROUPS. (Eng.) Smith, R. B.; Kettlewell, M. G.; Gough, M. H. (Radcliffe Infirmary, Oxford, England). *Br. J. Surg.* 64(6):406-409; 1977.

5736 INTERSPHINCTERIC EXCISION OF THE RECTUM. (Eng.) Lyttle, J. A.; Parks, A. G. (Guy's Hosp., London, England). *Br. J. Surg.* 64(6):413-416; 1977.

5737 RESULTS OF COLECTOMY FOR DIVERTICULAR DISEASE OF THE COLON. (Eng.) Charnock, F. M. L.; Rennie, J. R.; Wellwood, J. M.; Todd, I. P. (St. Bartholomew's Hosp., London, England). *Br. J. Surg.* 64(6):417-419; 1977.

5738 THE "SPASTIC COLON" SYNDROME: THERAPEUTIC AND PATHOPHYSIOLOGIC CONSIDERATIONS. (Eng.) Lechin, F.; van der Dijs, B.; Bentolila, A.; Pena, F. (Av. Mexico y Sur 21, Edif. Santa Maria, 4° piso, Los Caobos, Caracas, Venezuela). *J. Clin. Pharmacol.* 17(7):431-440; 1977.

5739 DURATION OF SYMPTOMS AND PROGNOSIS OF CARCINOMA OF THE COLON AND RECTUM. (Eng.) Irvin, T. T.; Greaney, M. G. (Royal Infirmary, Sheffield, England). *Surg. Gynecol. Obstet.* 144(6):883-886; 1977.

5740 VOLVULUS OF THE COLON. (Eng.) Grodsinsky, C.; Ponka, J. L. (Henry Ford Hosp., 2799 W. Grand Blvd., Detroit, MI 48202). *Dis. Colon Rectum* 20(4):314-324; 1977.

5741 PRIMARY CARCINOMA OF THE APPENDIX. (Eng.) Herczeg, E.; Winter, S.; Weissberg, D. (Shmuel Harofe Government Hosp., Be'er Yaakov, Israel). *JAMA* 238(1):51-52; 1977.

5742 MODIFIED DUHAMEL OPERATION FOR HIRSCHSPRUNG'S DISEASE. (Eng.) Parrish, R. A. (Medical Coll. Georgia, Augusta, GA 30902). *Am. Surg.* 43(5):283-286; 1977.

5743 CARCINOMA OF THE COLON AND RECTUM: A PERSPECTIVE FOR PRACTICING PHYSICIANS, WITH RECOMMENDATIONS FOR SCREENING. (Eng.) Dean, T. M. (Frontier Nursing Service, Hyden, KY 41749). *West. J. Med.* 126(6):431-440; 1977.

5744 COLOSCOPIC INVERSION. (Eng.) Huber, A.; Weiss, W. (Ambulatorium NORD, KA Rudolfstiftung, A-1030 Vienna, Austria). *Endoscopy* 9(1):42-43; 1977.

5745 EXCESSIVE DEPENDENCE ON THE LEUKOCYTOSIS CUE IN DIAGNOSING APPENDICITIS. (Eng.) English, D. C.; Allen, W.; Coppola, E. D.; Sher, A. (Michigan State Univ. Clinical Center, East Lansing MI 48823). *Am. Surg.* 43(6):363-402; 1977.

5746 PATHOLOGY OF THE ANAL GLANDS WITH SPECIAL REFERENCE TO THEIR MUCIN HISTOCHEMISTRY. (Eng.) Fenger, C.; Filipe, M. I. (Hvidovre Hosp., DK-2650 Hvidovre, Denmark). *Acta Pathol. Microbiol. Scand.* [A] 85(3):273-285; 1977.

5747 FAMILIAL POLYPOSIS. (Eng.) Marshak, R. H.; Lindner, A. E.; Maklansky, D. (1075 Park Ave., New York, NY 10028). *Am. J. Gastroenterol.* 67(2):177-189; 1977.

5748 ARTHRITIS, INFLAMMATORY BOWEL DISEASE, AND HISTOCOMPATIBILITY ANTIGENS. (Eng.) Russell, A. S. (Dept. Medicine, Univ. Alberta, Edmonton, Alberta, Canada). *Ann. Intern. Med.* 86(6):820-821; 1977.

5749 THE UPTAKE OF GALLIUM 67 IN COLONIC MACROPHAGES. (Eng.) Dance, D. R.; Nash, A. G.; McCready, V. R. (Royal Marsden Hosp., Fulham Rd., London S.W.3, England). *Eur. J. Nucl. Med.* 1(2):27-29; 1976.

5750 CURRENT MANAGEMENT OF CARCINOMA OF THE ANUS AND PERIANUS. (Eng.) Sawyers, J. L. (Metropolitan General Hosp., 72 Hermitage Ave., Nashville, TN 37210). *Am. Surg.* 43(7):424-429; 1977.

5751 TRANSIENT MEGACOLON AFTER GASTROSCOPY. (Eng.) Mann, N. S.; Sachdev, A. J. (800 Zorn Ave., Louisville, KY 40202). *South. Med. J.* 70(6):755-756; 1977.

5752 LIVER SCANNING IN PATIENTS WITH COLORECTAL CARCINOMA. (Eng.) Wong, J.; Ong, G. B. (Queen Mary Hosp., Hong Kong). *Aust. N.Z. J. Surg.* 47(1):76-80; 1977.

5753 FAMILIAL RETROCECAL APPENDICITIS. (Eng.) Budd, D. C.; Fouty, W. J., Jr. (Natl. Naval Medical Center, Bethesda, MD 20014). *Am. J. Surg.* 133(6):670-671; 1977.

5754 SOLITARY PERFORATED DIVERTICULUM OF ASCENDING COLON [Letter to Editor]. (Eng.) Rao, D. D. (Isle Thanet District Hosp., Margate, Kent, England). *Br. Med. J.* 2(6080): 192; 1977.

5755 ISCHEMIC DISEASE OF THE COLON AND ORAL CONTRACEPTIVES. (Eng.) Martin, D. W., Jr.; Watts, H. D.; Smith, L. H., Jr.; *et al.* (Dept. Medicine, Univ. California, San Francisco, CA 94143). *West. J. Med.* 126(5):378-385; 1977.

5756 ULTRASONIC BLOOD FLOW ASSESSMENT IN COLON. (Eng.) Kurstin, R. D.; Soltanzedeh, H.; Hobson, R. W., II.; Wright, C. B. (Dept. Thoracic, Cardiovascular Surgery, Univ. Iowa, Iowa City, IA 52242). *Arch. Surg.* 112(3):270-272; 1977.

See also, 5302, 5467, 5474, 5475, 5476, 5486, 5487, 5512, 5526, 5527, 5533, 5538, 5544, 5549, 5550, 5579, 5592, 5600, 5608, 5612, 5613, 5667, 5668, 5671, 5676, 5682, 5683, 5684, 5690, 5694, 5695, 5696, 5697, 5698, 5699, 5757, 5758, 5759, 5760, 5761, 5762, 5764, 5765, 5766, 5769, 5770, 5791, 5931, 5935, 5939, 5943, 5949, 5950, 5955, 5962, 5964, 5975, 5977, 5978, 5979, 5981, 5982, 5985, 5987, 5989.

LARGE INTESTINE

Ulcerative Colitis

5757 ACUTE SPONTANEOUSLY RECOVERING ULCERATING COLITIS (ARUC): REPORT OF 6 CASES. (Eng.) Bonfils, S.; Hervoir, P.; Girodet, J.; Le Quintrec, Y.; Bader, J. P.; Gastard, J. (Hopital Bichat, 170 Boulevard Ney, 75877 Paris Cedex 18, France). *Am. J. Dig. Dis.* 22(5):429-436; 1977.

The cases of six patients with an unclassifiable, extensive, ulcerating colitis that had a spontaneously reversible course are presented. The patients included four women (aged 20-23 yr) taking p.o. contraceptives and a 69-yr-old woman and a 51-yr-old man, neither of whom had any specific drug history. No previous disease and no precipitating factors were found. Appendectomy was performed prior to the diarrhea occurrence in three cases. Bacteriological and parasitological studies were negative in all cases. All patients had a febrile nonbloody diarrhea. Radiological involvement of the whole colon with superficial ulcerations and preservation of haustra occurred in all patients, and rectal and ileal ulceration was present in only one patient each. Anal lesions occurred in only one patient. The clinical symptoms remitted within 1 month in all patients, and radiological abnormalities disappeared within 2-5 months. Treatment consisted of a low-fiber diet, water and electrolyte replacement, and various intestinal antiseptics (salicylazosulfapyridine, sulfaguanidine, Intetrix). In four cases, corticosteroids were given in the absence of a specific diagnosis. The patients have experienced no symptoms during follow-up periods between 18 months and 5 yr. These cases could represent a new entity or could be a particular form of Crohn's disease of the colon, with delayed diagnostic pathological features.

5758 PRELIMINARY FINDINGS ON GLYCOCALYX IN COLON EPITHELIAL CELLS IN NORMAL SUBJECTS AND IN PATIENTS WITH ULCERATIVE COLITIS. (Ita.) Ceralli, F.; Familiari, G.; Marinozzi, G.; Muccioli-Casadei, D. (Istituto di Anatomia Umana Normale, Universita di Roma, Rome, Italy). *Bull. Soc. Ital. Biol. Sper.* 52(12):886-891; 1976.

An investigation was made of the glycocalyx in patients with ulcerative colitis and in normal subjects. Biopsy material was obtained from patients with clinically evident ulcerative colitis and patients suspected of having the disease. Some of these latter patients were subsequently shown to be normal and served as controls. In normal subjects, the glycoprotein cellular mantle was well-defined and the cells were contiguous. In patients with colitis, the mantle was thin, not contiguous, and irregular. The glycocalyx in colitis patients was almost completely absent. Where it could be seen, it was irregular and a large portion of the microvilli had been lost. Microvilli that were present were highly irregular in appearance. In normal patients, the glycocalyx formed a continuous layer on the surface of the microvilli, which were normal in appearance. It is suggested that the pathological process of ulcerative colitis may be due to a viral agent.

5759 RECTAL MUCOSAL ADRENERGIC INNERVATION AND ENTEROCHROMAFFIN CELLS IN ULCERATIVE COLITIS AND IRRITABLE COLON.

(Eng.) Kyosola, K.; Penttila, O.; Salaspuro, M. (Maria Hosp., SF-00180 Helsinki 18, Finland). *Scand. J. Gastroenterol.* 12(3):363-367; 1977.

The glyoxylic acid-induced fluorescence histochemical technique was used to determine whether there are alterations in the intrinsic adrenergic innervation and the enterochromaffin cells (EC) in ulcerative colitis and the irritable colon syndrome. Rectal mucosal biopsies of 13 patients with ulcerative colitis, 7 patients with the irritable colon syndrome, and 7 controls were studied. In comparison with control biopsy specimens, specimens from patients with ulcerative colitis had significantly increased adrenergic nerve network densities ($p<0.01$). The mean diameter of the varicosities was also increased, as was the number of varicosities per given length of axon ($p<0.001$). The intensity of the fluorescence of varicosities of comparable size was significantly increased ($p<0.001$), and the number of EC was significantly decreased ($p<0.01$). In contrast, the number of EC in the irritable colon syndrome was significantly increased ($p<0.05$) compared with that in controls. The results suggest that biogenic amines are involved in both ulcerative colitis and the irritable colon syndrome.

5760 EMOTIONAL FACTORS IN INFLAMMATORY BOWEL DISEASE.

(Eng.) Zisook, S.; DeVaul, R. A. (Univ. Texas Medical Sch. at Houston, Houston, TX 77030). *South. Med. J.* 70(6):716-719; 1977.

Emotional factors influencing the pathogenesis and the course of inflammatory bowel disease are discussed, and the cases of three patients are reviewed. The most widely studied emotional factors related to the cause and pathogenesis of inflammatory bowel diseases include personality constellations and specific stress reactions. Some investigators describe the ulcerative colitis personality as an "obsessive-compulsive personality," while others doubt the specificity of personality configuration with inflammatory bowel diseases and maintain that the disease itself may affect the patient's personality. The stress situation that is most often cited as influencing the onset and exacerbations of inflammatory bowel diseases is the loss (actual or threatened) of an important love relationship. Examples include an 18-yr-old man who developed his first attack of ulcerative colitis shortly after both of his parents were killed, a 21-yr-old woman who felt she could not cope with college and examinations without the help and support of her parents, and a 25-yr-old man who developed colitis shortly before his marriage to a women who was not accepted by his parents. Problems encountered in the management of the disease include the patient's denial of illness or his overtly assuming a sick role, the meaning of the symptoms to the patient, managing the patient's feelings of loss or rejection, and managing the patient's feeling of diminished self-control. Inflammatory bowel diseases are not caused by emotional conflicts, but emotional factor influence both the pathogenesis and course of the illnesses. Establishing a trusting physician-patient relationship is important in treatment.

5761 CANCER IN CHRONIC ULCERATIVE COLITIS: DIAGNOSTIC ROLE OF SEGMENTAL COLONIC LAVAGE.

(Eng.) Katz, S.; Katzka, I.; Platt, N.; Hajdu, E. O.; Bassett, E. (1300 Union Turnpike, New Hyde Park, NY 11040). *Am. J. Dig. Dis.* 22(4): 355-364; 1977.

The use of segmental colonic lavage for the detection of cancer in 74 patients with chronic ulcerative colitis is reported. Approximately 500-1,000 cm^3 saline was introduced as a pulsatile lavage through a polyethylene catheter powered by a commercially available dental irrigating unit in the biopsy channel of a colonoscope. Fluid was retrieved simultaneously in a suction trap containing an equal volume of 95% alcohol. The aspirate was centrifuged at 2,500 revolutions/min for 15 min. Papanicolau smears were obtained from the sediment, and the remaining material was processed according to cell-block techniques and examined in tissue sections. Rectocolonic biopsies were obtained, whe possible, via rigid and flexible endoscopes. Colonic carcinoma was found in six of the above patients. Two diagnoses of malignancy were establish by cytologic smears and cell block alone. Two patients had positive mucosal biopsies and cell block One patient with a hepatic flexure carcinoma and a second patient with a malignancy proximal to a left colon stricture were missed by the above techniques Segmental lavage in areas of stricture or grossly distorted mucosa or in endoscopically inaccessible areas appears to represent a valuable adjunct in th diagnosis of carcinoma in chronic ulcerative coliti

5762 LOCALIZED TUMOR-LIKE LESIONS IN ULCERATIV COLITIS AND CROHN'S DISEASE OF THE COLON.

(Eng.) Martinez, C. R.; Siegelman, S. S.; Saba, G. P.; Diaconis, J. N.; Yardley, J. H. (Johns Hopkins Hosp., 601 North Broadway, Baltimore, MD 21205). *Johns Hopkins Med. J.* 140(5):249-259; 1977.

The roentgenographic manifestation of localized inflammatory lesions of the colon as localized tumor-like lesions is discussed, and case reports of two patients with ulcerative colitis and two patients with Crohn's disease are presented. Localized tumor-like lesions of the colon in ulcerative colitis are radiographically more often discrete and polypoid than in Crohn's disease and may be associated with stricture formation. In both of the patients with ulcerative colitis, the histologic features of the pseudopolyps were entirely benign. Narrowing of the bowel lumen adjacent to areas of pseudopolyposis was noted in both of these patients In patients with Crohn's disease of the colon, localized areas of colonic involvement can present as flat or nodular eccentric filling defects, with or without ulcers or deep fissures; their radiographic appearance is like that of a malignant gastric ulcer. Pathologically, these lesions are

t likely to consist of an elevated mound of
osa and underlying structures that are edematous
infiltrated with inflammatory cells. Ulcers
deep fissures are often found with normal mucosa
ervening; lymphoid hyperplasia, as seen in one
the two patients with Crohn's disease, is less
mon but can also occur. Such lesions may repre-
t the earliest and only finding in Crohn's
ease of the colon and may disappear upon insti-
ion of appropriate therapy or may progress into
more typical skip segments of colonic involve-
t. They are likely to be confused radiographic-
y with primary or metastatic carcinoma, lymphoma,
focal areas of ischemic colitis. In view of
higher risk of colonic carcinoma in patients
n ulcerative colitis, and to a lesser degree in
ients with Crohn's disease of the colon, it is
ommended that all such localized lesions of the
on be meticulously examined by double (air-
ium) contrast examination, colonoscopy, and bi-
ies to determine the precise nature of the dis-
er before extensive surgery is performed.

3 CONTRIBUTION OF RETROGRADE CHOLANGIOGRAPHY
IN A CASE OF PRIMARY SCLEROSING CHOLANGI-
. (Fre.) Descamps, C.; Gillain, A.; Vanheuver-
n, R.; Haot, J.; Pringot, J.; Dive, C. (Dept. de
ecine interne, Univ. catholique de Louvain, Clin.
versitaires Saint-Luc, avenue Hippocrate 10,
) Bruxelles, Belgium). *Acta Gastroenterol. Belg.*
1/2):55-65; 1977.

are case of cholestasis associated with a well
erated ulcerative colitis of 10 years' duration
described. Retrograde cholangiography permitted
iagnosis of primary sclerosing cholangitis, based
the irregular narrowing of the choledochus with
atation above this point. The ulcerative coli-
was of diagnostic significance, since 30% of
es of primary sclerosing cholangitis are asso-
ed with it. Antibiotic therapy (ampicillin,
/day; gentamicin, 40 mg/day) caused temporary
rovements during recurring bouts of icterus and
itis, but did not prevent further stenosis of
choledochus, which was evident on a repeat chol-
iography 1 yr later. A choledochojejunostomy
performed with excellent results.

4 TOTAL PARENTERAL NUTRITION AND INFLAM-
MATORY BOWEL DISEASE [Abstract]. (Eng.)
.ly, J.; Ryan, J.; Strole, W.; Fischer, J.
ssachusetts General Hosp., Boston, MA). *Acta*
. Scand. (Suppl. 466):92-93; 1976.

5765 INFLAMMATORY BOWEL DISEASE--A NEW METHOD OF TREATMENT [Abstract]. (Eng.) MacFadyen, B. V., Jr.; Dudrick, S. J. (Univ. Texas Medical Sch. at Houston, Houston, TX). *Acta Chir. Scand.* (Suppl. 466):90-91; 1976.

5766 SURGICAL MANAGEMENT OF ULCERATIVE COLITIS IN CHILDHOOD. (Eng.) Foglia, R.; Ament, M. E.; Fleisher, D.; Fonkalsrud, E. W. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Am. J. Surg.* 134(1):58-63; 1977.

5767 ULCERATIVE COLITIS AND CROHN'S DISEASE: IMPLICATIONS FOR COLLEGE HEALTH PROGRAMS. (Eng.) Gelpi, A. P. (Cowell Student Health Center, Stanford, CA 94305). *J. Am. Coll. Health Assoc.* 25(4):264-269; 1977.

5768 CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS: CORRELATION TO ACTIVITY OF THE DISEASE [Abstract]. (Eng.) Nielsen, H.; Binder, V.; Svehag, S. E. (Inst. Medical Microbiology, Odense Univ., Odense, Denmark). *Scand. J. Immunol.* 6:732; 1977.

5769 FATAL COLITIS IN A HEMOPHILIC PATIENT WITH INHIBITOR. (Eng.) Schwartz, K. A.; Penner, J. A.; Fekety, R. F., Jr.; Bailey, R. W. (Simpson Memorial Inst., 102 Observatory St., Ann Arbor, MI 48104). *South. Med. J.* 70(5):617-619; 1977.

5770 MEGALOBLASTIC ANAEMIA ASSOCIATED WITH SULPHASALAZINE TREATMENT. (Eng.) Schneider, R. E.; Beeley, L. (St. Margaret's Hosp., Great Barr, Birmingham, England). *Br. Med. J.* 1(6077):1638-1639; 1977.

See also, 5483, 5513, 5548, 5748, 5979, 5984,

PANCREAS

1 CHOLANGIOPANCREATOGRAPHY AND PANCREATIC
CYTOLOGY IN CARCINOMA OF THE PANCREAS.
;.) Wilkins, R. A.; Hatfield, A. (Northwick
: Hosp. and Clinical Res. Center, Watford Rd.,
ow, Middlesex HA1 3UJ, England). *Am. J.*
tgenol. 128(5):747-749; 1977.

The usefulness of cytologic examination of pure pancreatic juice collected at endoscopic retrograde cholangiopancreatography (ERCP) was evaluated in 23 laparotomy- or autopsy-proven cases of pancreatic carcinoma. ERCP was performed preoperatively in all cases, and the flow of pancreatic juice was stimulated by the i.v. injection of secretin (1 U/kg). The pancreatic duct was cannulated and opacified in 17 cases, and pancreatic juice cytology was obtained in all 17. Six of the 17 patients had total obstruction of the pancreatic duct, and 6 others showed extreme narrowing of the main pancreatic duct; these 12 cases were therefore thought to be highly suggestive of carcinoma. The pancreatic juice cytology revealed malignant cells in 8 of the 17 cases; all but one of the eight cases had either total obstruction or extreme narrowing of the pancreatic duct. All eight cases with positive cytology had carcinomas involving the head or neck of the pancreas. Among five patients in whom the radiologic diagnosis was equivocal (those in which the pancreatic narrowing was not as extensive as in the above 12 cases and 1 patient in whom the pancreatic duct was not visualized), cytology revealed malignant cells and confirmed the diagnosis in two. In the remaining five cases in which it was not possible to cannulate the ducts adequately, pancreatic juice cytology demonstrated malignant cells in all.

5772 CANCER AND ADVANCED PANCREATITIS OF THE HEAD OF THE PANCREAS IN THE ERCP (ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY). (Ger.)

Justich, E.; Wiedner, F.; Kratochvil, P.; Brandstatter, G. (Universitatsklinik fur Radiologie, Landeskrankenhaus Graz, A-8036 Graz, Austria). *Roentgenblaetter* 30(7):343-346; 1977.

The difficulties in the differential diagnosis of three cases each of carcinoma and chronic pancreatitis of the head of the pancreas by endoscopic retrograde cholangiopancreatography (ERCP) are presented. Patients with chronic pancreatitis showed stenosis of the common bile duct, pseudocystic cavities in the head of the pancreas, pancreatic calcification, or irregular constriction at the stenosed and dilated intrapancreatic bile duct. One patient with carcinoma also showed stenosis at the common bile duct with a kink formation and constriction of the pancreatic duct. The other two patients showed a depression with a break, stenosis, or constriction of the common bile duct. The average age of the patients with carcinoma was 65.2 yr as compared with 49.4 yr for patients with chronic pancreatitis. Due to the similarities of images seen by ERCP, additional diagnostic methods should be used to diagnose these diseases.

5773 PROSPECTIVE EVALUATION OF THE PANCREATIC SECRETION OF IMMUNOREACTIVE CARCINOEMBRYONIC ANTIGEN, ENZYME, AND BICARBONATE IN PATIENTS SUSPECTED OF HAVING PANCREATIC CANCER. (Eng.)

DiMagno, E. P.; Malagelada, J. R.; Moertel, C. G.; Go, V. L. W. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 73(3):457-461; 1977.

The suggestion that measurement of immunoreactive carcinoembryonic antigen (CEA) in pancreatic secretion may be useful in the diagnosis of pancreatic cancer was tested in 57 patients with abdominal pain, weight loss, obstructive jaundice, or unexplained pancreatitis. Using duodenal intubation and a perfusion method, the rate of pancreatic CEA secretion into the duodenum was measured under basal saline perfusion, alone and with continuous i.v. infusion of secretin (2 clinical U/kg/hr) and of cholecystokinin-pancreozymin (CCK, 15 Crick-Harper-Raper U/kg/hr); the CEA output was compared with secretion of trypsin, lipase, and bicarbonate under the same conditions. Subsequent laparotomy revealed pancreatic carcinoma in 25 patients, pancreatitis in 7, other intraabdominal malignancies in 6, and benign nonpancreatic disorders in 19. CEA output rates did not differentiate all pancreatic cancer patients from other patients in any test condition. However, pancreatic enzyme outputs were abnormal with almost 90% of cancers of the pancreatic head and with 75% of cancers of the pancreatic body and tail. For detection of pancreatic cancer, enzyme and bicarbonate outputs in response to CCK are more accurate than pancreatic CEA or bicarbonate outputs in response to secretin Since it is known that CCK-stimulated enzyme outputs can be related accurately to malabsorption, they may be preferable to bicarbonate output for assessment of pancreatic function.

5774 DUODENOSCOPY AND ENDOSCOPIC PANCREATOGRA IN PATIENTS WITH POSITIVE MORPHINE PROSTIGMINE TESTS. (Eng.)

Gregg, J. A.; Taddeo, A. E Milano, A. F.; McCartney, A. J.; Santoro, B. T.; Frager, S. H.; Capobianco, A. G. (110 Francis St., Boston, MA 02215). *Am. J. Surg.* 134(3):318-321; 1977.

The relation between pancreatic disease, an abnorm morphine prostigmine test, and endoscopic retrogra cholangiopancreatography (ERCP) was studied. Twen three patients with abdominal pain and positive morphine prostigmine tests underwent duodenoscopy and ERCP. Sixteen patients demonstrated marked or moderate ampullary stenosis. The pancreatic duct was dilated in three and stenotic in four. Ampull stenosis was confirmed in all patients who subsequently underwent sphincteroplasty. Only six patients had pancreatitis demonstrated by laboratory studies or at surgery. Relief of pain after sphin teroplasty was complete in 10 patients during foll up. Despite the problems in interpreting the morphine prostigmine test, the authors believe that the combined use of this test and ERCP in patients with indeterminate upper abdominal pain and suspected pancreatic disease is important and that a significant number of abnormalities of the sphincter of Oddi and the pancreatic duct are present in suc patients.

5775 CANCER OF THE PANCREAS IN BLACKS: A TEN YEAR EXPERIENCE. (Eng.)

Stevens, J.; Leffall, L. D., Jr.; Agbatha, A.; Anderson, J. (Howard Univ. Hosp., Washington, DC 20060). *J. Natl. Med. Assoc.* 69(4):249-251; 1977.

5776 METASTATIC PANCREATIC ISLET CELL CARCINOMA WITH PEPTIC ULCER DISEASE AND HYPERCALCEMIA. (Eng.) Anonymous. (Washington Univ. Sch. Medicine, St. Louis, MO 63130). *Am. J. Med.* 63(1): 142-151; 1977.

5777 PAROTID SALIVA TESTS IN PATIENTS WITH PANCREATIC DISEASES BEFORE AND AFTER SURGERY. (Eng.) Kakizaki, G.; Saito, T.; Soeno, T.; Sasahara, M.; Fujiwara, Y.; Saito, Y.; Noto, N. (Akita Univ. Sch. Medicine, Akita, Japan). *Tohoku J. Exp. Med.* 121(3):247-252; 1977.

5778 PANCREATOLITHIASIS AND PANCREATIC CARCINOMA: EVALUATION OF PANCREATIC EXCRETION TEST WITH 5,5-DIMETHYL-2,4-OXAZOLIDINEDIONE. (Eng.) Noda, A.; Kamiya, N.; Takayama, T.; Hayakawa, T. (Nagoya Univ. Sch. Medicine, Tsuruma-cho, Showa-ku, Nagoya, 466 Japan). *Arch. Intern. Med.* 137(6):754-760; 1977.

5779 CARCINOEMBRYONIC ANTIGEN LEVELS IN PANCREATIC CARCINOMA. (Eng.) Paloyan, D.; Simonowitz, D. (4935 Estes, Skokie, IL 60076). *Am. Surg.* 43(6):410-412; 1977.

5780 EFFECTS ON NUTRITION OF SURGERY OF THE LIVER, PANCREAS, AND GENITOURINARY TRACT. (Eng.) Shils, M. E. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Cancer Res.* 37(7, Part 2):2387-2394; 1977.

5781 PANCREATIC ASCITES: CALCIFICATION AS A CLUE TO DIAGNOSIS. (Eng.) Carneiro Chaves, F. J. Z.; Amarante, M., Jr.; Domingues, W. S.; Lopes, C. (Hospital de S. Joao, Porto, Portugal). *Am. J. Gastroenterol.* 67(3):253-256; 1977.

5782 RISK FACTORS AND EARLY DIAGNOSIS IN PANCREATIC CARCINOMA. (Eng.) Morgan, J. E.; Martyak, S. N. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06519). *Am. J. Gastroenterol.* 67(1):257-260; 1977.

5783 THE ABSORPTION OF VITAMIN B_{12} IN CHRONIC PANCREATIC INSUFFICIENCY. (Eng.) von der Lippe, G. (Medical Dept. A, Univ. Bergen, N-5016, Haukeland sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 12(3):257-259; 1977.

5784 HETEROTOPIC PANCREAS DIAGNOSED BY CANNULATION AND DUCT STUDY. (Eng.) Rohrmann, C. A., Jr.; Delaney, J. H., Jr.; Protell, R. L. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Am. J. Roentgenol.* 128(6):1044-1045; 1977.

5785 THE INS AND OUTS OF ORAL PANCREATIC ENZYMES [Letter to Editor]. (Eng.) Meyer, J. H. (Univ. California at Los Angeles-San Fernando Valley Medical Program, Sepulveda, CA 91343). *N. Engl. J. Med.* 296(23):1347-1348; 1977.

See also, 5511, 5519, 5520, 5521, 5523, 5535, 5540, 5700, 5790, 5932, 5950.

PANCREAS

Pancreatitis

5786 PANCREATITIS IN CHILDREN AND ADOLESCENTS. (Eng.) Jordan, S. C.; Ament, M. E. (Sch. Medicine, Univ. California, Los Angeles, CA 90024). *J. Pediatr.* 91(2):211-216; 1977.

Studies were carried out to establish normal serum values for amylase in children, to review the etiology of pancreatitis in children, and to characterize the clinical manifestations of pancreatitis in childhood. Normal serum amylase values (47.7 ± 28.6 mg/dl) were established for the pediatric age group in 68 subjects aged 0-17 yr; these values were higher than previously stated. Average serum amylase values increased with increasing age (r=0.55). The three commonest causes of pancreatitis in 54 patients studied were drug-induced (16), idiopathic (10), and traumatic (7). Prednisone was the most frequently implicated drug. Midepigastric pain and vomiting were the presenting symptoms in 75% of the patients. Serum amylase values were more than three times normal in 63.8% of patients; 17% of patients presented with normal serum amylase values. The typical patient received i.v. therapy for 5.4 days and was hospitalized for 9.4 days. Treatment with antibiotic and anticholinergic drugs did not alter mortality or morbidity rates. The mortality rate for acute interstitial pancreatitis was 17.5%, and for acute hemorrhagic pancreatitis, 86%.

5787 PHENFORMIN-ASSOCIATED PANCREATITIS. (Eng.)

Chase, H. S., Jr.; Mogan, G. R. (Mount Sinai Hosp., 100 St. and Fifth Ave., New York, NY 10029). *Ann. Intern. Med.* 87(3):314-315; 1977.

The case of a 70-yr-old diabetic man who developed acute hemorrhagic pancreatitis and severe lactic acidosis while taking phenformin is reported. The patient was not receiving any other medications, nor did he have any of the known metabolic conditions associated with pancreatitis. Four previously published cases of patients who developed acute pancreatitis while taking phenformin are reviewed. Three of those patients also developed lactic acidosis, a well-known complication of phenformin therapy. Although phenformin has been reported to increase the serum amylase activity and to alter the content of the pancreatic secretions in response to various stimuli, the manner in which the drug might cause acute pancreatitis remains completely unknown.

5788 AMYLASE ACTIVITY OF PAROTID SALIVA IN ACUTE AND CHRONIC PANCREATITIS. (Eng.)

Grimmel, K.; Rossbach, G.; Kasper, H. (Medizinische Universitatsklinik, Josef-Schneider-Str. 2, 8700 Wurzburg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):334-344; 1976.

Amylase activity was determined in the parotid saliva of patients with acute and chronic pancreatitis. In 17 patients with chronic relapsing pancreatitis between attacks, the mean amylase concentration (43.5 ± 32.5 U/ml) was significantly lower ($p<0.001$) than that of 17 control subjects (178.2 ± 84.5 U/ml) without pancreatic disease. Four patients with acute pancreatitis exhibited salivary amylase concentrations in the upper normal to grossly supranormal range (199.4-712.7 U/ml), whereas three patients with acute attacks of chronic relapsing pancreatitis showed reduced levels of amylase (17.3-60.7 U/ml) in comparison with controls and patients with acute pancreatitis. Unlike amylase output, the amylase concentration in the parotid resting saliva was independent of the salivary flow rate. The simultaneous infusion of secretin and pancreozymin produced a significant increase in the parotid salivary amylase levels in both patients without pancreatic disease and in those with chronic relapsing pancreatitis between acute attacks, with the post-treatment amylase concentrations being 251 ± 89.6 and 85.8 ± 61.2 U/ml, resp. Maximal stimulation of amylase following the infusion of the two hormones at 48 U/hr each was attained after a lag period of 15-30 min, irrespective of body weight. Since the amylase concentration, unlike amylase output, is independent of the parotid flow rate, the results indicate that the determination of amylase concentration in resting saliva is adequate for diagnosing pancreatic disease.

5789 SERUM IONIZED CALCIUM IN ACUTE PANCREATITIS. (Eng.)

Allam, B. F.; Imrie, C. W. (Stobhill General Hosp., Glasgow, G21 3UW, Scotland). *Br. J. Surg.* 64(9):665-668; 1977.

Serum ionized calcium was measured daily for 7 da after admission in eight consecutive patients wit acute pancreatitis to determine the frequency and degree of hypocalcemia. The results supported findings of the authors' previous study that the most common cause of the low serum calcium often found in pancreatitis patients is a low serum albumin; when correction of serum calcium is made for hypoalbuminemia, most patients are found to have normal calcium levels. The occasional hypocalcemia as shown by the "corrected" serum calciu or by serum ionized calcium measurement was usual mild and transient, indicating that the normal homeostatic mechanisms of the body efficiently maintained the physiologically active fraction of serum calcium within, or close to, the normal ran These findings explained the rarity of overt and subclinical tetany in acute pancreatitis and show that correction of serum calcium for albumin prov similar information to the direct measurement of serum ionized calcium. The value of "apparent" hypocalcemia in assessing severity of acute pancr atitis requires reappraisal, while greater attent should be directed towards the study and manageme of hypoalbuminemia in this disease.

5790 REACTIVE DUODENAL CHANGES IN CHRONIC PANCREATITIS SIMULATING THE CONTIGUOUS SPREAD OF PANCREATIC CARCINOMA. (Eng.)

Blacksto M. O.; Mizuno, H. (Dept. Medicine, Univ. Chicago, Box 400, 950 E. 59 St., Chicago, IL 60637). *Am. Dig. Dis* 22(7):658-661; 1977.

A case of chronic pancreatitis in which reactive changes of the duodenal mucosa simulated the contiguous spread of carcinoma and also predispos to a rare complication of endoscopic retrograde cholangiopancreatography (ERCP) is presented. Th patient, a 59-yr-old man with a 10-yr history of heavy drinking, presented with weight loss, anore early satiety, cramping abdominal pain, and nause and vomiting. An upper gastrointestinal series was interpreted as showing marked widening of the "C" loop with compression and irregularity of the loop, suggesting impingement on the duodenum by a mass in the head of the pancreas. Calcificatio within the head of the pancreas were also noted, and the picture was thought to represent carcinom of the head of the pancreas in preexisting chroni pancreatitis. Pancreatic ultrasound examination also suggested carcinoma. Examination of the duodenum during ERCP revealed an injected nodular, friable mucosa, although biopsies were negative for malignancy. ERCP was complicated by submucos injection of contrast material into the friable duodenal mucosa, which resulted in a portal venog The procedure was terminated, and the patient did not develop sepsis. Surgical exploration reveale severe chronic calcific pancreatitis with pseudocysts. A Whipple procedure was performed; carefu sectioning of the resected specimen did not demonstrate evidence of a tumor. This case illustrates the nonspecific nature of endoscopic and x-ray findings of the descending duodenum in pancreatic disease. The presence of marked mucos friability may be a relative contraindication to performing ERCP.

5791 COLONIC FISTULAS DURING ACUTE PANCREATITIS. REPORT OF THREE CASES. (Fre.) Giuli, R.; Colletas, J.; Lortat-Jacob, J. L. (Hopital Beaujon, 100, boulevard du General Leclerc, 92110 Clichy, France). *Ann. Chir.* 31(6):501-504; 1977.

A report of colonic fistula occurring late in the course of acute pancreatitis in 3 of 160 cases seen over a 10-yr period is presented. Two patients developed external fistulas 3 and 8 days, resp., after installation of an external drain; one succumbed to a massive hemorrhage, the other recovered fully. A third patient developed an internal fistula 1 month after evacuation of a false cyst. It healed spontaneously over the next two months. In view of the severe complications, mainly hemorrhage and infection, which usually follow fistulization and lead to a mortality rate of nearly 50%, surgical intervention to resect the affected colon segment is recommended.

5792 REVERSIBLE CRESCENTIC GLOMERULONEPHRITIS FOLLOWING AN ACUTE EXACERBATION OF CHRONIC RELAPSING PANCREATITIS. (Eng.) Dickmeyer, J. P.; Wolfson, W.; Kowell, A.; Dornfeld, L. (20426 Lake Chabot Rd., Suite 11, Castro Valley, CA 94546). *Arch. Intern. Med.* 137(8):1065-1067; 1977.

The case of a 42-yr-old man with recurrent episodes of acute glomerulonephritis following exacerbations of chronic relapsing pancreatitis is presented. Light microscopy of the renal biopsy performed during the episode of acute glomerulonephritis showed fibroepithelial crescents involving 70% of the glomeruli. The patient recovered without specific therapy. The time interval involved and the presence of subendothelial deposits with mesangial deposition of C3 complement and IgM suggest immune complex injury.

5793 CAUSES AND TREATMENT OF JAUNDICE ASSOCIATED WITH INFLAMMATORY PANCREATIC DISEASE. (Ger.) Neher, M.; Mangold, G.; Kummerle, F. (Chirurgische Universitatsklinik, 6500 Mainz, Langenbeckstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 102:644-647; 1977.

Biliary stasis or jaundice developed in 32 of 82 patients with acute pancreatitis and in 58 of 152 patients with chronic pancreatitis within 5 yr of treatment. Of these patients, a biliary cause was present in 12 with acute and 19 with chronic pancreatitis. Twenty-two of the 32 patients with acute pancreatitis had a hemorrhagic necrotizing course; 1 patient had an abscess of the pancreas. On the other hand, of 50 patients with acute pancreatitis but without jaundice, necrotic inflammations were only seen on 3 occasions. Clinical-chemical examination of patients with acute pancreatitis revealed obstructive jaundice with bilirubin levels up to 50 mg/l as compared to bilirubin levels of 50-150 mg/l in patients with chronic pancreatitis. The main form of therapy for biliary acute pancreatitis consisted of cleansing of the bile ducts by cholecystectomy, cholecystectomy with choledochus revision and a T-drain, sequestrotomy, and a left resection. Patients with biliary chronic pancreatitis with jaundice were subjected to similar measures in addition to partial or total duodenopancreatectomy, subtotal left resection (child), cystojejunostomy, and compensation of a biliodigestive anastomosis. Twenty-five of 38 patients with nonbiliary chronic pancreatitis had a resection of the pancreas head for severe inflammatory changes.

5794 CALCULOUS PANCREATITIS. (Rus.) Orlov, V. A. (I. M. Sechenov First Medical Inst., Moscow, USSR). *Klin. Med.* 55(4):81-83; 1977.

See also, 5481, 5511, 5519, 5520, 5529, 5662, 5772, 5774, 5778, 5785.

LIVER AND BILIARY TRACT

5795 LIVER SIZE IN NORMAL INFANTS AND CHILDREN. (Eng.) Carpentieri, U.; Gustavson, L. P.; Leach, T. M.; Bunce, H., III. (Univ. Texas Medical Branch, Galveston, TX 77550). *South. Med. J.* 70 9):1096-1097; 1977.

Liver span was determined in 165 healthy children 35 boys, 80 girls) between 2 months and 5 yr of age. The heights and weights of all children fell between the 5th and 95th percentiles for their age. The superior edge of the liver was delimited by percussion, while palpation was used for the inferior edge. Liver span was correlated significantly with body height, weight, surface area, and age. However, it was best correlated with body surface area (r=0.73), reflecting a constant relation between body size and liver size. Assessment of liver span is a useful test for evaluation of a child with apparent liver enlargement.

5796 LIVER DISEASE IN PREGNANCY.

(Ita.) D'Amato, T. (Ospedale Generale Provinciale di Venezia-Mestre, Divisione Osterica-Ginecologica, Venezia, Italy). *Minerva Ginecol.* 29(2):79-90; 1977.

Liver diseases that occur during and as a result of pregnancy are discussed. Special emphasis is placed upon the effect of idiopathic cholestatic icterus. A comparison was made of enzyme levels in the blood and amniotic fluid of 12 women with icterus and 14 healthy women. The enzymes studied included SGPT, SGOT, lactic dehydrogenase, cholinesterase, leucine aminopeptidase, and alkaline phosphatase. No significant difference was found in enzyme levels in the two groups, suggesting that such measurements are not good indications of fetal stress during pregnancy. It is recommended that, in a clinical situation, fetal distress be determined by other means. Other liver diseases, particularly viral hepatitis, are discussed in light of recent literature.

5797 LIVER TISSUE LECITHIN: CHOLESTEROL ACYLTRANSFERASE ACTIVITY IN PATIENTS WITH LIVER DISEASE.

(Eng.) Ras, M. R.; Frison, J. C.; Rubies-Prat, J.; Romero, R.; Masdeu, S.; Schwartz, S. (Dept. Internal Medicine, Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Av. Valle Hebron s/n, Barcelona 16, Spain). *Biomedicine* 27 (4):141-143; 1977.

To study the relation between cholesterol acyltransferase (LCAT) and related lipid disturbances in blood and liver biopsies, LCAT activity was determined in the sera and liver tissue of 21 patients with parenchymal liver disease and in 5 healthy controls. Serum LCAT activity was normal in the 21 patients with liver damage (25.4 ± 5.5 μg/ml/hr), the level being similar to that in controls (23.7 ± 2.8 μg/ml/hr). A good correlation was found between serum LCAT activity and the proportion of serum cholesterol esters ($r=0.57$, $p<0.01$). The proportion of esterified cholesterol in liver biopsy specimens in the patients was similar to that in controls and was relatively low compared with those in serum (33.6 ± 10.2% versus 69.7 ± 5.1%, $p<0.001$). No correlation was found between the relative proportion of phospholipids and other lipid fractions, neither in serum nor in liver tissue. The proportion of cholesterol esters in liver tissue is much higher than expected according to the low tissue LCAT activity; this suggests that cholesterol esters in parenchyma may be a storage form of cholesterol esterified in plasma pool.

5798 TYRAMINE OXIDASE ACTIVITY IN NEEDLE BIOPSY OF NORMAL LIVERS AND DISEASED LIVERS.

(Eng.) Arima, T.; Okada, Y.; Kubota, M.; Nagata, K.; Higuchi, Y.; Hayashi, S.; *et al.* (Okayama Univ. Medical Sch., 2-5-1, Shikata-Cho, Okayama 700, Japan). *Enzyme* 22(2):124-129; 1977.

The activities of tyramine oxidase (TO), UDP-glucuronyl transferase (GT), and acetyl CoA (AC) in needle biopsies of abnormal livers from 42 patients were determined and compared with those of 10 normal specimens. The TO, GT, and AC activities (U/kg protein) of normal livers ranged from 2,610 to 3,54 734 to 1,025, and 21.1 to 26.6, resp. The TO, GT, and CA activities of the abnormal specimens were: 1,960-4,650, 604-898, and 20.3-28.2, resp., for 15 patients with active chronic hepatitis; 3,970-4,160 660-678, and no data (nd), resp., for 2 patients with fatty liver (unknown cause); 3,200-3,330, 615-886, and 46.5-64.6, resp., for 2 patients with alcoholic fatty liver; 3,670-4,520, 723-732, and nd, resp., for 2 patients with toxic hepatitis; 3,290-3,510, 726-943, and nd, resp., for 2 patients with inactive chronic hepatitis; 2,130, 809, and nd resp., for 1 patient with acute hepatitis in convalescence; 2,320-2,810, 745-828, and 38.2, resp., for 2 patients with alcoholic fibrosis; 1,820-2,400 923-959, and 22.5, resp., for 3 patients with alcoholic hepatitis; 760-2,250, 507-807, and 1.71, resp., for 2 patients with active alcoholic cirrhos 2,730-3,540, 756-859, and nd, resp., for 2 patients with inactive alcoholic cirrhosis; 2,580-3,140, 700 831, and 22.6, resp., for 2 patients with active nonalcoholic cirrhosis; 2,990, 801, and nd, resp., for 1 patient with Banti's syndrome; 4,090, 608, and nd, resp., for 1 patient with primary biliary cirrhosis; 3,550, 541, and nd, resp., for 1 patient with Gilbert's disease; 2,920, 868, and nd, resp., for 1 patient with Rotor's disease; 2,470, 658, and 18.4, resp., for 1 patient with intrahepatic cholestasis; 3,180, 923, and 18.5, resp., for 1 patient with cholangiohepatitis; and 1,690, 571, and 40.7, resp., for 1 patient with acute cardiac venous stasis. Thus, TO was elevated in livers with nonalcoholic fatty change or toxic hepatitis and reduced in livers with fibrosis or chronic alcoholic injury. GT activity was reduced in livers with severe parenchymal damage or hyperbilirubinemia. AC activity was decreased markedly in active alcoholic cirrhotic liver and was elevated in alcoholi fatty livers as well as in a liver with acute veno stasis.

5799 TRANSJUGULAR LIVER BIOPSY.

(Eng.) Gilmore, I. T.; Bradley, R. D.; Thompson, R. P. H. (St. Thomas' Hosp., London SE1 7EH, England). *Br. Med. J.* 2(6079):100-101; 1977.

Experience with taking liver biopsy specimens thro a hepatic vein, entering from the right internal jugular vein, was assessed in 26 patients. Biopsy specimens were obtained in all 26 patients but wer adequate for full histological assessment only in 16. No patient showed any sign of blood loss afte the procedure. Transjugular liver biopsy is valuable when percutaneous biopsy is hazardous, or whe pressure measurements or venography are also required.

5800 'ROUTINE' LIVER BIOPSY IN UPPER ABDOMINAL SURGERY. (Eng.) Michel, S. L.; Lipsky, R.; Morgenstern, L. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Arch. Surg.* 112(8):959-961; 1977.

The incidence of unsuspected or undiagnosed hepatic abnormalities was assessed in 125 patients in whom a liver biopsy was carried out routinely at the time of elective or emergency abdominal surgery. Specifically excluded were hepatic lesions unexpectedly identified at laparotomy. Sixty-seven percent of the liver biopsy specimens were abnormal, the most frequent findings being fatty metamorphosis, cholestasis, triaditis, fibrosis, inflammatory infiltrate, cholangitis, cirrhosis, and hepatitis. The most frequent operation performed was cholecystectomy. In 63 patients with chronic cholecystitis, there was a 51% incidence of abnormal liver histology, while in 9 patients with acute cholecystitis, the incidence was 78%. In 83% of all other operations, abnormal liver biopsy specimens were identified. Bile leakage, hemorrhage, and infection did not occur in this series, despite inclusion of patients with severe biliary obstruction, abnormal clotting factors, and intra-abdominal sepsis. New techniques of histochemical enzyme analysis and electron microscopy are expected to enhance the clinical correlation of occult hepatic lesions. Liver biopsy is a safe, informative adjunct to all upper abdominal procedures.

5801 CORRELATION OF COMPUTED TOMOGRAPHY, GRAY SCALE ULTRASONOGRAPHY, AND RADIONUCLIDE IMAGING OF THE LIVER IN DETECTING SPACE-OCCUPYING PROCESSES. (Eng.) Bryan, P. J.; Dinn, W. M.; Grossman, Z. D.; Wistow, B. W.; McAfee, J. G.; *et al.* (Upstate Medical Center, 750 E. Adams St., Syracuse, NY 13210). *Radiology* 124(2):387-393; 1977.

Experience with the use of computed tomography (CT; scanning time=2.7 min), gray scale ultrasonography, and radionuclide imaging in 51 patients with space-occupying hepatic lesions is reviewed. The abilities of the three modalities to detect these lesions were graded on a numerical rating scale from 0 to 5. Ultrasonography scored 3.5, CT scored 3.2, and radionuclide imaging scored 2.9. CT resulted in no false-positives and six false-negatives (12%), caused mainly by motion artifacts. The simplest technique, radionuclide imaging, also had the smallest number of false-negatives (2 cases or 4%) and is, therefore, recommended as the screening procedure of choice. The false-positive rate for this procedure was 4%. The false-positive rate for sonography was 2%, and the false-negative rate was 6%. Sonography or CT should be carried out in patients with prior suspicious findings.

5802 WOUND HEALING AND COMPLICATIONS OF THE LIVER AFTER PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (Eng.) Mori, W.; Mukawa, K. (Univ. Tokyo Faculty Medicine, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113 Japan). *Acta Hepatogastroenterol. (Stuttg.)* 24(2):86-92; 1977.

Hepatic damage and wound healing were examined at autopsy in 10 patients who had received percutaneous transhepatic cholangiography (PTC). Autopsies were performed day 0, 2, 7, 13, 16, 41, 42, 53, and 56 after PTC examination. The diagnosis had been pancreas head carcinoma in three cases; gallbladder carcinoma in two cases; hepatic duct carcinoma in one case; bile duct carcinoma in one case; intrahepatic bile stasis in one case; hemolytic anemia, cholelithiasis, and liver cirrhosis in one case; and Paget's disease with obstructive jaundice due to metastasis in one case. Hemocoagulation or hematoma formation on the hepatic surface and intraperitoneal hemorrhage were seen at the 7th day after PTC, but not on the 13th day. The puncture scar on the hepatic capsule was seen up to the 16th day after PTC, but not on the 41st day or thereafter. Damage to the hepatic parenchyma was observed until the 7th day after PTC and was repaired by the 13th day. Intrahepatic hematoma was seen until the 13th day after PTC. In general, intrahepatic trauma caused by PTC appeared to be completely absent, without evidence of scar, after about 2 weeks.

5803 BILIARY COMPLICATIONS AFTER LIVER TRANSPLANTATION: WITH SPECIAL REFERENCE TO THE BILIARY CAST SYNDROME AND TECHNIQUES OF SECONDARY DUCT REPAIR. (Eng.) Starzl, T. E.; Putnam, C. W.; Hansbrough, J. F.; Porter, K. A.; Reid, H. A. S. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80220). *Surgery* 81(2):212-221; 1977.

Biliary complications after liver transplantation are discussed with special reference to biliary cast syndrome. In 93 consecutive cases of orthotopic liver transplantation, there were 24 cases of biliary obstruction and 8 of bile fistula formation. Six of the obstructed livers developed biliary cast formation, which was so extensive that the smaller intrahepatic ducts became plugged to an extent that they could no longer be treated surgically. Bile duct reconstruction in these six patients had been by cholecystoduodenostomy in five patients and choledochocholedochostomy in the sixth. In each of the six cases, the most important causative factor was neglected obstruction of the large bile ducts, with the intrahepatic lesions apparently being late and secondary. Stone and/or cast formation also occurred in other obstructed livers in the presence of bile fistulas, but these deposits were limited to the large ducts where they could be removed. Although homograft bile undoubtedly increased lithogenicity at certain postoperative times, biliary sludge formation was always associated with defective bile duct reconstruction, underscoring the urgency with which reoperation must be considered. Secondary intervention involving the conversion from cholecystojejunostomy to choledochojejunostomy resulted in the salvage of homografts in eight of nine patients and in the survival of seven of these patients. When the original reconstruction was with cholecystoduodenostomy, a procedure which was abandoned because of its poor results, the secondary operation was to anastomose the dilated common duct to the defect in the duodenum. Only one survivor emerged from six such attempts, and this survivor eventually required conversion to Roux-en-Y choledochojejunostomy because of repeated bouts of cholangitis. The other five patients died from regional and systemic infection, duodenal fistula, and inadequate biliary decompression.

5804 TRANSPLANTATION OF THE LIVER. (Eng.)

Putnam, C. W.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80262). *Surg. Clin. North Am.* 57(2):361-373; 1977.

Experience with 113 cases of liver transplantation is presented. Of 103 patients undergoing transplants more than 1 yr ago, 30 are still alive. Transplants have been performed for nonresectable hepatoma, cholangiocarcinoma, hemangioendothelial sarcoma, Klatskin tumor, biliary atresia, alcoholic cirrhosis, postnecrotic cirrhosis, chronic aggressive hepatitis, Wilson's disease, α_1-antitrypsin deficiency, primary biliary cirrhosis, and the Budd-Chiari syndrome. Successful transplantation has not yet been achieved for patients with fulminant liver failure from hepatitis or other toxic agents. The worst results have been in patients with alcoholic cirrhosis; of 10 alcoholics transplanted, only one has achieved long-term survival. In contrast, patients with postnecrotic cirrhosis or chronic aggressive hepatitis have a much more favorable prognosis. The validity of metabolic correction by liver transplantation was established in a 16-yr-old girl with α_1-antitrypsin deficiency. After a first transplant, which was eventually rejected, the patient developed normal levels of α_1-antitrypsin and adopted the donor phenotype. Following a retransplantation after rejection of the initial graft, the patient died of pulmonary infectious complications. With the exception of reestablishing biliary drainage, the technical problems surrounding liver transplantation have largely been solved.

5805 ALPHA-1-ANTITRYPSIN DEFICIENCY. (Ger.)

Kunzer, W. (Univ.-Kinderklinik, Mathildenstr. 1, 7800 Freiburg i. Br., W. Germany). *Klin. Paediatr.* 189(3):199-205; 1977.

The relation of alpha-1-antitrypsin (AT) deficiency to specific diseases is reviewed. A deficiency of AT is associated with neonatal hepatitis, obstructive pulmonary emphysema, membrane proliferative glomerulonephritis, rheumatoid arthritis, Weber-Christian disease, myopathies, and ulcerative colitis. AT comprises about 90% of the alpha-1-globulins in the serum and is also found in small quantities in amniotic fluid, duodenal juice, bronchial and nasal secretions, saliva, tears, colostrum, and breast milk; its half-life is 5-6 days, and it is probably produced in the liver. Several genetic variants of AT exist due to the existence of multiple codominant alleles at a single locus. AT inhibits proteolytic enzymes. In homozygotes, the protease inhibitor (Pi) type MM is dominant, as compared wit Pi types MX and MS in heterozygotes. Newborns with Pi type ZZ are highly susceptible to disease, especially liver diseases, because this type causes serious AT deficiency. These liver diseases, whose pathogenesis is unclear, may be neonatal hepatitis, hepatomegaly, hepatosplenomegaly, or portal hypertension with hematemesis. In addition to liver cell inclusions, cholestasis, bile duct granulation infiltrated portal fields, giant cell formation, hematopoetic foci, cell necroses, portal firbosis, and cirrhosis have also been found in children with defective alleles and liver function disturbances. No successful therapy is known; phenobarbital and prednisone do not affect blood AT levels, nor do they prevent the development of cirrhosis. Prophylactic measures are required, and alcohol and nicotine use should be avoided.

5806 SERUM ANTIBODIES IN PATIENTS WITH EXTRAINTESTINAL AMEBIASIS (AMEBIC LIVER ABSCES AND HEALTHY PERSONS. (Ger.)

Mannweiler, E.; Mohr, W.; Hofler, W.; Lederer, I. (Bernhard-Nocht-Institu fur Schiffs- und Tropenkrankheiten, 2000 Hamburg 4, Bernhard-Nocht-Str. 74, W. Germany). *Dtsch. Med. Wochenschr.* 101(52):1915-1919; 1977.

Tests for serum antibodies against two ameba antigens were performed by complement fixation, indirect hemagglutination (IHA), latex agglutination (LA), and double gel diffusion on the sera of 70 patients with amebic liver abscesses, 204 travelers returning from tropical countries, and 136 inhabitants from a region of endemic amebiasis but without evidence of the disease. Suspicious or borderline results were noted in 73.3% of sera of patient with extraintestinal amebiasis by IHA and in 90.4% by LA. Of the sera from the 204 travelers, suspicious or borderline serum antibody tests against the two antigens were detected in 12.1% (IHA) to 18.9% (LA) of the samples as compared with 16.2% (LA) to 46.3% (IHA) of the samples from 136 inhabitants of the endemic disease region. The serum of one patient who died of multiple liver abscesses was negative in all immunological tests. Antibody titers could still be detected in one patient with amebic liver abscess up to 2 years after therapy. Overall, useful diagnostic results were obtained most frequently in patients with amebic liver abscess after several different tests had been performed.

5807 BUDD-CHIARI SYNDROME AFTER TAKING ORAL CONTRACEPTIVES: A CASE REPORT AND REVIEW OF 14 REPORTED CASES. (Eng.)

Wu, S. M.; Spurny, O. M.; Klotz, A. P. (Menorah Medical Cente 4949 Rockhill Rd., Kansas City, MO 64110). *Am. J. Dig. Dis.* 22(7):623-628; 1977.

The case of a patient who developed the Budd-Chiari syndrome after taking oral contraceptives is presented, and 14 similar cases in the literature are

eviewed. The patient, a 24-yr-old woman, had been
aking oral contraceptives (norethindrone acetate
nd ethinyl estradiol) for 4 yr. She presented with
ausea, anorexia, cramping abdominal pain, headache,
onstipation, and discolored urine. After discon-
inuing the contraceptives, her symptoms became more
ntense, and her abdomen was distended with ascites.
ne liver function tests were abnormal, and she had
sudden onset of tachycardia and stupor. Hepatic
ein thrombosis was diagnosed, on the basis of sel-
ctive hepatic arteriogram findings. Therapy with
nticoagulant was not initiated because of a low
brinogen level (107 mg/dl), a prolonged activated
rtial thromboplastin time (40/29 sec), and a pro-
nged prothrombin time (25/11.5 sec). Her fibrin
lit products were not present, and the platelet
unt was normal. Her mental status improved fol-
wing neomycin therapy. She developed thrombo-
lebitis, and low-dose therapy with heparin was
gun. A vena cavagram showed obstruction of the
patic vein and marked narrowing of the inferior
na cava and obstruction of the left iliac vein.
e improved after continued treatment with neomy-
n, heparin, and diuretics, and her liver function
sts (except for blood ammonia) returned to normal.
llow-up studies showed increasing abdominal venous
llateral circulation; moderately elevated liver
zymes; total occlusion of the inferior vena cava
th the development of collateral circulation;
ophageal varices; and hepatic, portal, and splenic
in occlusion.

08 DIFFERENTIAL DIAGNOSIS OF BENIGN LIVER TUMORS.

(Ita.) Mangold, G.;
rschner, P.; Wagner, R.; Hohn, P. (Chirur-
sche Universitatklinik, Universitat Mainz, 65
inz, Langenbeckstr. 1, W. Germany). *Minerva*
d. 66(63):3261-3267; 1975.

o patients with focal nodular hyperplasia were
eated with surgical intervention. Although the
esenting symptoms of both patients were not
aracteristic of liver neoplasms, angiogram exam-
ation revealed the presence of a vascularized
ver tumor. Histologically the tumors appeared
be hamartomas. Definitive classification was
fficult, however, because of confusion in the
erature about the classification of benign liver
nors. The symptoms, diagnosis, therapy, and
stology of benign liver tumors are briefly dis-
sed.

09 57-COBALT-BLEOMYCIN AS A TUMOR SCANNING AGENT IN PRIMARY HEPATOCELLULAR CANCER.

g.) Kew, M.; Allen, J.; Levin, J. (Johannesburg
eral Hosp., Johannesburg, S. Africa). *Eur. J.*
l. Med. 1(4):247-250; 1976.

o-bleomycin and ^{99m}Tc-sulfur colloid scans were
formed in 13 southern African Negro patients with
mary hepatocellular cancer (PHC) and 3 patients
h other space-occupying hepatic lesions. Visual
parisons of scan pictures from bleomycin and sul-
colloid scans were used to assess uptake ability.
ective concentration of ^{57}Co-bleomycin in the defects seen on the ^{99m}Tc-sulfur colloid scan occurred in only 4 of the 13 patients with PHC. The ^{57}Co-bleomycin and ^{99m}Tc-sulfur colloid scans were identical to the remaining PHC patients, as well as in the two patients with metastatic liver disease and the one patient with an amebic liver abscess. It appears that ^{57}Co-bleomycin has only a limited place as a tumor-seeking agent in the diagnosis of PHC in southern African Negroes.

5810 DIAGNOSIS OF HEPATOCELLULAR CARCINOMA BY SERIAL DETERMINATION OF SERUM α-FETOPROTEIN CONCENTRATION.

(Jpn.) Yumoto, Y.; Namba, T.; Tanaka, Y.; Taketa, K.; Ohta, Y.; Mitani, K. (Okayama Univ. Medical Sch., Okayama, Japan). *Jpn. J. Gastroenterol.* 73(6):659-667; 1976.

The clinical significance of serum alpha fetoprotein (AFP) determination by radioimmunoassay (RIA) in the diagnosis of hepatocellular carcinoma was studied. The mean serum AFT value in 30 healthy controls was 5.6 ± 2.6 ng/ml. Normal horse serum was used to dilute the sera of patients with high AFP levels. The level of serum AFP was over 2,000 ng/ml in 75.5% of 49 patients with hepatocellular carcinoma, in 0.64% of 157 patients with hepatitis or liver cirrhosis, and 3.8% of 52 patients with gastric cancer metastatic to the liver. Histological examination of tissue from four patients with hepatocellular carcinoma in whom the serum AFP level remained below 300 ng/ml revealed only stages I and II carcinoma; stage III carcinoma occurred only in patients with AFP levels over 300 ng/ml.

5811 ANGIOGRAPHIC DEMONSTRATION OF INTRAHEPATIC ARTERIO-PORTAL ANASTOMOSES IN HEPATOCELLULAR CARCINOMA.

(Eng.) Okuda, K.; Musha, H.; Yamasaki, T.; Jinnouchi, S.; Nagasaki, Y.; Kubo, Y.; *et al.* (Chiba Univ. Hosp., Chiba 280, Japan). *Radiology* 122(1):53-58; 1977.

Hepatic angiograms of 114 patients with hepatocellular carcinoma (HCC) were studied to investigate intrahepatic arterioportal anastomoses. Arterioportal shunts of varying sizes, evidenced by opacification (contrast medium, 30-50 ml of 70% sodium methylglucamine diatrizoate) of intrahepatic portal branches, were seen in 72 patients. Retrograde flow of the contrast medium beyond the hilus and back into the portal vein was reported in 29 cases. The flow of contrast medium was antegrade when normal portal branches were opacified. Maximum frequency of opacification was reported in the portal vein (21%) and its smaller branches (22.18%). Four types of shunts were found: (1) through a tumor thrombus in the portal branch, (2) in a retrograde direction via a peripheral tumor nodule, (3) through a small tumor invading or amputating an artery, and (4) through a tumor located near a major portal vein branch and supplied by a large, coiling artery. This last type is very rare (5 cases). The exact course of contrast medium transit could be delineated only in this type. Postmortem angiography of the liver (with ultrafine barium sulfate) in 50 patients with HCC suggests that arterioportal shunts are the result of the special vasculature in HCC and are highly diagnostic when accompanied by other angiographic changes.

5812 CLINICOPATHOLOGICAL STUDIES OF MINUTE HEPATOCELLULAR CARCINOMA. ANALYSIS OF 20 CASES, INCLUDING 4 WITH HEPATIC RESECTION.

(Eng.) Okuda, K.; Nakashima, T.; Obata, H.; Kubo, Y. (Chiba Univ. Hosp., Chiba 280, Japan). *Gastroenterology* 73(1):109-115; 1977.

Liver specimens of sixteen autopsies and four cases of hepatic resection in which the liver had a solitary hepatocellular carcinoma smaller than 4.5 cm, or a few tumor nodules smaller than 3.5 cm, were analyzed. Clinically, these patients presented with signs and symptoms compatible with cirrhosis (spider nevi, stigmata of portal hypertension, low SGOT:SGPT ratio). Of the 16 autopsy cases, only 2 had been diagnosed correctly. In all but four cases, the noncancerous parenchyma showed advanced cirrhosis of the mixed type, with irregularly sized multilobular nodules and thin strands of stroma, different from typical alcoholic cirrhosis. The primary lesion was grossly encapsulated in the majority, suggesting a slow, expanding growth. Histologically, most primaries were relatively well differentiated. Serum α-fetoprotein was generally low (<100 ng/ml in 7 patients, 100-1,000 ng/ml in 3, and >1,000 ng/ml in 4), and it served as the major diagnostic clue in only five cases. In patients with mildly abnormal α-fetoprotein levels, continuous monitoring seems important to detect a steady rise, the first warning for tumor growth.

5813 RADIOTHERAPY OF HEMANGIOMA CAVERNOSUM OF THE LIVER.

(Eng.) Okazaki, N.; Yoshino, M.; Yoshida, T.; Ohno, T.; Kitagawa, T.; Hattori, N. (Natl. Cancer Center Hosp., Tsukiji 5-1-1, Chuo-ku, Tokyo, Japan 104). *Gastroenterology* 73(2): 353-356; 1977.

Experience with radiotherapy in four patients with massive cavernous hemangioma of the liver is presented. Each patient received 6 MeV x-ray, and favorable results were obtained in three. The tumor in the remaining patient, a 41-yr-old man in whom an abdominal mass had been untreated for 5 yr, showed no response to a total tumor dose of 940 rads; the patient died 6 months later. Patient 2, a 39-yr-old woman, received a total dose of 1,900 rads over 54 days, with a daily dose of 50-100 rads. Although the hemangioma regressed after treatment, the response was transient. A total tumor dose of 2,940 rads was given over 41 days, with a daily dose of 100-200 rads as a second course, and the hemangioma regressed with no sign of re-enlargement. Patients 3 and 4 were given 150-200 rads every other day to a total of about 3,000 rads, with satisfactory regression of both tumors. Follow-up studies showed that patients 2-4 were well 8, 5, and 4 yr after radiotherapy, resp. Because a total tumor dose of 3,000 rads is sufficient to produce permanent histological kidney damage or "radiation hepatitis," a somewhat smaller total dose with a sufficient fractional dose is advisable (although no such changes occurred in these patients).

5814 KUPFFER CELL SARCOMA OF THE LIVER: REPO
OF 2 CASES IN SOUTH AFRICAN BLACKS. (En

Greenberg, M. (Baragwanath Hosp., Johannesburg,
South Africa). *S. Afr. Med. J.* 52(6):244-246; 19

The first known cases of Kupffer cell sarcoma of t
liver in two South African black patients are re-
ported. The first patient, a 26-yr-old woman, die
3 months after developing abdominal pain. The sec
ond patient, a 56-yr-old man, presented with an
acute abdomen and died after laparotomy 6 days lat
Neither patient was jaundiced. Autopsy revealed
an enlarged, nodular, hemorrhagic liver with areas
of necrosis in both cases. The normal architectu
was almost completely destroyed by a diffusely in-
filtrating vascular malignancy. Large lacunae an
anastomosing channels were apparent. The neoplas
cells lining these spaces ranged from small elong-
ated or spindle-shaped, to larger more pleomorphi
and bizarre cells. Multinucleate giant cells wer
also seen. Mitoses were rare in the first patien
but were more frequent in the second. The neopla
endothelial cells in the second patient tended to
be larger and more bizarre, and hemopoietic foci
were prominent. No evidence of cirrhosis or expo-
sure to Thorotrast was present in either patient.

5815 REVIEW: ENDOTOXINS AND LIVER DISEASE.

(Eng.) Wilkinson, S. P. (King's Coll.
Hosp., Denmark Hill, London, S.E.5, England). *Sc*
J. Gastroenterol. 12(4):385-386; 1977.

The role of endotoxins in liver diseases and poss
methods for treating endotoxemia are reviewed. I
terest in the role of endotoxins in liver disease
is twofold. First, endotoxins are hepatotoxic an
might therefore directly contribute towards the
pathogenesis of some forms of liver disease. Sec
ond, with the development of a portasystemic coll
teral circulation, endotoxins are likely to esca
into the systemic circulation and might be respo
sible for some extrahepatic manifestations of
liver disease, such as renal failure and intrava
cular coagulation. Liver necrosis, occurring se
ondary to an experimental choline-deficient diet
can be prevented or delayed if the experimental
animals are either raised in a germ-free environ-
ment or given p.o. nonabsorbable antibiotics. T
severity of galactosamine hepatitis can be dimin
by prior colectomy. These and other studies sug
that the products of intestinal bacteria are at
least partly responsible for the development of
injury. A role for endotoxins is particularly
likely in alcoholic liver disease. Systemically
administered endotoxins have caused renal failur
intravascular coagulation, and gastric mucosal h
orrhage in experimental animals, which may provi
an explanation for the close correlation between

systemic endotoxemia and the development of these complications in patients with fulminant hepatic failure. Possible treatments for endotoxemia include immunization, nonabsorbable antibiotics (e.g., neomycin), and polymyxins.

5816 TREATMENT OF FULMINANT HEPATIC FAILURE BY POLYACRYLONITRILE-MEMBRANE HAEMODIALYSIS. (Eng.) Silk, D. B. A.; Trewby, P. N.; Chase, R. A.; Mellon, P. J.; Hanid, M. A.; Davies, M.; *et al.* (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5, England). *Lancet* 2(8027):1-3; 1977.

The value of hemodialysis with a polyacrylonitrile membrane was studied in 24 patients with fulminant hepatic failure who had deteriorated to grade IV coma. Nine of the 24 treated patients fully recovered consciousness, and eight survived to leave the hospital. These results are compared with previously reported results in patients receiving conservative management alone (15% survival in 53 cases) and those obtained initially with charcoal hemoperfusion (38%). Of the 16 treatment failures, cerebral edema was found at necropsy in 13. Whether this would have been less of a problem if treatment had been started earlier in the course of the illness remains to be determined.

5817 TREATMENT OF GAUCHER'S DISEASE WITH LIPOSOME-ENTRAPPED GLUCOCEREBROSIDE: β-GLUCOSIDASE. (Eng.) Belchetz, P. E.; Crawley, J. C. W.; Braidman, I. P.; Gregoriadis, G. (Sch. Medicine, Univ. Pittsburg, Pittsburg, PA 15261). *Lancet* 2 (8029):116-117; 1977.

The treatment of Gaucher's disease with liposome-entrapped glucocerebroside:β-glucosidase is reported. The patient, a 25-yr-old woman, received 10 ml of a mixture of liposomes containing 1,320 U of glucoerebroside:β-glucosidase and ^{111}In-labeled lipoomes (0.3 mCi) i.v. on March 15; entrapped enzyme was administered again on March 19 (1,876 U), June 9 (10,819 U), and October 20 (403 U). On December , she received ^{111}In-labeled liposomes (1.2 mCi) and on April 4, a fifth dose (260 U) of the entrapped nzyme was administered. After this treatment, the ower border of the right hepatic lobe had moved p 3 cm, and the left lobe had shrunk. Reduction n the size of the liver was associated with relief f pressure symptoms in the left lower abdomen. uring treatment, the plasma level of aspartic cid transaminase fell from 70 to 50 IU/l, glutamyl ranspeptidase ranged from 200 to 300 IU/l, and lkaline phosphatase fell from 45 to 35 King Armtrong U. Whole body scans showed an increased rate f elimination of liposomes from the circulation fter 9 months of treatment, reflecting improvement n the participation of liver in liposome uptake. he results suggest that liposomes hold promise n the treatment of Gaucher's disease.

818 END-TO-SIDE ANASTOMOSIS OF THE MESENTERIC VEIN TO THE INFERIOR VENA CAVA IN THE REATMENT OF GLYCOGEN STORAGE DISEASE: CASE REPORT. Eng.) Esato, K.; Yasutake, S.; Kaku, R.; Yamaki, R. (Yamaguchi Univ. Sch. Medicine, Ube, Yamaguchi, Japan). *Surgery* 82(2):287-290; 1977.

The case of a patient who underwent an end-to-side anastomosis of the mesenteric vein to the inferior vena cava for the treatment of Type I glycogen storage disease is presented. The patient was investigated at the age of 2 yr for hepatomegaly, at which time the liver was palpable 12 cm below the costal margin, and no ascites were present. At laparotomy, the mesenteric vein was cut near the junction of the ileocolic vein, 3 cm of its proximal segment was separated from the accompanying artery, and it was anastomosed to the inferior vena cava. The patient had an uneventful postoperative course, and the liver had become almost unpalpable by the fifth month after surgery. At this time, the previously elevated serum cholesterol and blood sugar levels had returned to normal. The blood ammonia level increased but remained within normal limits, and ketonuria had disappeared completely. Four years after surgery, the blood sugar and ammonia levels were still within normal limits, but the serum cholesterol was higher than normal. The serum alkaline phosphatase and SGPT levels decreased but did not return completely to normal. The patient was asymptomatic, and his height and weight were normal. The efficacy and simplicity of end-to-side anastomosis of the mesenteric vein to the inferior vena cava suggest that it should be used in further cases of glycogen storage disease.

5819 SELECTIVE HEPATIC ARTERY EMBOLIZATION TO CONTROL MASSIVE HEPATIC HEMORRHAGE AFTER TRAUMA. (Eng.) Rubin, B. E.; Katzen, B. T. (George Washington Univ. Medical Center, 901 23rd St., N.W., Washington, DC 20037). *Am. J. Roentgenol.* 129(2):253-256; 1977.

Two patients in whom angiography and transcatheter embolization techniques were used in the diagnosis and treatment of intrahepatic and intraperitoneal hemorrhage due to trauma are reported. Selective and subselective arteriography identified the hemorrhagic artery in each case. Transcatheter therapeutic embolization successfully stopped the hemorrhage acutely in one patient and produced almost complete cessation of hemorrhage in the other patient. No further blood replacement was required after the embolization procedures. Liver function tests were abnormal prior to embolization and gradually improved afterward. Neither patient required surgery, and both were discharged from the hospital. Each patient has remained free of symptoms for 5 and 4 months, resp. Arteriography offers accurate diagnostic information and therapeutic potential in patients who experience hemorrhage following trauma. In addition, therapeutic embolization may offer decreased morbidity and reduced hospital stay. Successful results of therapeutic embolization depend on awareness of its usefulness and upon rapid mobilization of angiographic and support personnel.

5820 THE HEPATIC PORPHYRIAS: PATHOGENESIS, MANIFESTATIONS, AND MANAGEMENT. (Eng.)

Bloomer, J. R. (Dept. Medicine, Yale Univ. Sch. Medicine, New Haven, CT). *Gastroenterology* 71(4): 689-701; 1976.

The pathogenesis, manifestations, and management of hepatic porphyrias are reviewed. The following types of hepatic porphyrias and their clinical and biochemical manifestations are identified: acute intermittent porphyria with neuropsychiatric symptoms (NS) and elevated urinary levels of prophobilinogen (PBG) and delta-aminolevulinic acid (ALA); variegate porphyria (VP), with skin lesions (SL), elevated urinary coproporphyrin (COP), PBG, and ALA, and elevated fecal levels of COP and protoporphyrin (PRO); hereditary coproporphyria (VP, SL, elevated urinary levels of COP, PBG, and ALA, and elevated fecal COP); porphyria cutanea tarda, with SL, structural hepatic disease (SHD), and elevated urinary uroporphyrin; protoporphyria (SL, SHD, elevated red cell PRO, and elevated fecal PRO); and secondary porphyrinuria (SHD and elevated urinary COP). All of the hepatic porphyrias are inherited in an autosomal dominant pattern, with the possible exception of porphyria cutanea tarda; however, clinical manifestations rarely develop before puberty, except in protoporphyria where there is usually life-long photosensitivity. Histologically, birefringent pigment deposits in the liver is a specific feature of protoporphyria because hepatic pigment deposits in various other disorders do not show birefringence. Cholelithiasis occurs in some patients with protoporphyria. Liver disease is common in patients with porphyria cutanea tarda, with hepatic siderosis being a common feature. In secondary porphyrinuria, an observed increased urinary excretion of coproporphyrin is presumable, due in large part to the fact that biliary excretion of this compound is impaired. Current therapy for hepatic porphyrin disorders includes chlorpromazine, propoxyphene, and glucose loading for mild attacks and glucose loading, meperidine, and hematin infusions for severe attacks of acute intermittent porphyria. Phlebotomy is used to manage porphyria cutanea tarda. In protoporphyria, skin manifestations are treated with β-carotene, and hepatic disease is treated with cholestyramine and sometimes, with vitamin E. Secondary porphyrinuria is managed by treating the underlying hepatobiliary disease.

5821 HEREDITARY HEPATIC PORPHYRIAS IN FINLAND.

(Eng.) Mustajoki, P.; Koskelo, P. (Third Dept. Medicine, Univ. Helsinki, Helsinki, Finland). *Acta Med. Scand.* 200(3):171-178; 1976.

The occurrence of hepatic porphyrias (acute intermittent porphyria [AIP] and variegate porphyria [VP] in Finland was studied. The diagnosis of hereditary hepatic porphyria was made in 152 cases, 107 of AIP (diagnostic criterion-elevated urinary porphobilinogen), and 45 of VP (diagnostic criterion: elevated fecal porphyrins). The prevalence of hereditary hepatic porphyrias in Finland was calculated to be 3.4/100,000 inhabitants (2.4/100,000 of AIP and 1.0/100,000 of VP). The AIP patients belonged to 35 families and the VP patients to 7 families. Porphyria was diagnosed in two or more successive generations in 20 families with AIP and in 6 families with VP. Eighty-nine patients had acute attacks and 63 patients were symptomless latent cases. Barbiturates (48 patients), infection (9 patients), sulphonamides (4 patients), and alcohol (3 patients) were the most usual precipitating factors in attacks. Fern extract (antihelminthic drug) was reported to be associated with porphyria. About 75% of patients were women. A slight fragilit of the skin on the back of the hands was reported in 50% of VP patients. In acute porphyria the serum protein-bound iodine (above 0.6 μM in 15/22 patients) and serum cholesterol (above 7.5 μM in 21/31 patients) were elevated. Disturbances in serum electrolytes were reported in 61% of the cases studied. The mortality in an acute porphyria attack was 30%. Fourteen percent of patients who survived an attack had later porphyria symptoms requiring hospitalization. The prognosis is better if porphyria is diagnosed in the latent stage.

5822 THE OPHTHALMOLOGIC MANIFESTATIONS OF WILSON'S DISEASE.

(Eng.) Wiebers, D. O.; Hollenhorst, R. W.; Goldstein, N. P. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 52(7):409-416; 1977.

Ophthalmologic abnormalities were studied in 53 patients with Wilson's disease. Of the 35 symptomatic patients initially seen and treated, 34 had Kayser-Fleischer rings, and 6 had sunflower cataracts at the time of diagnosis. In patients followed for 1 yr or more, penicillamine therapy resulted in improvement of the Kayser-Fleischer rings in 18 of 20 patients and total clearing of the sunflower cataracts in 4 of 5 patients. The specific pattern of copper deposition in Kayser-Fleischer rings and the improvement with treatment occurred along four reproducible stages. None of five asymptomatic siblings of patients with known Wilson's disease had Kayser-Fleischer rings at the time of initial study. In one (untreated) of the five, Kayser-Fleischer ring developed 20 months after the initial normal slit-lamp examination. The presence of Kayser-Fleische rings, and the absence of other ophthalmologic sig (such as nystagmus, cranial nerve palsies, and other movement disorders), can be of great assistance in the diagnosis of Wilson's disease. Once the condition has been diagnosed, specific therapy with penicillamine and low-copper diet can dramati cally improve what would otherwise be a fatal cour

5823 FIXED DRUG ERUPTION INDUCED BY SULPHOBRO PHTHALEIN.

(Eng.) Smith, E. L. (Government Hosp., Abu Dhabi, Oman). *Br. J. Dermatol.* 97(1):106-107; 1977.

The case of a 50-yr-old woman who developed erythematous skin lesions 8 hr after undergoing an i.v. BSP liver function test is presented. The lesions were discrete, round, raised, and measured 1.5-2.5 cm in diameter. After 48 hr, they showed central

hyperpigmentation. The lesions subsided over the
next 2 weeks. The patient had developed similar
lesions 2 yr previously following the ingestion of
a laxative. This is the first reported case of fixed
drug eruption from BSP. The patient was sensitive to
phenolphthalein and appeared to be cross-sensitive to
3SP.

5824 THE CLINICAL PHARMACOLOGY OF A HEPATOMA-
SPECIFIC ALKYLATING AGENT. (Eng.) Curt,
G. A.; Connors, T. A.; Murray-Lyon, I. M.; Tattersall,
I. H. N. (Charing Cross Hosp., London W6 8RF, England).
Biochem. Pharmacol. 26(18):1715-1718; 1977.

he clinical and biochemical pharmacology of CB10-
52, a latent enzyme-activated alkylating agent, was
tudied in hepatoma patients. Following p.o. admin-
stration (30 mg), the drug was absorbed rapidly, and
eak levels of unmetabolized drug were seen at 1
r. The parent drug is cleaved by azoreductase to
ield an alkylating agent with a very short half-
ife and stable metabolites. Peak plasma levels
f these metabolites were seen at 2 hr, with per-
istence of the compounds for 12 hr. Eight hours
fter drug administration, 80% of the dose had
een eliminated in the urine, the majority in the
orm of metabolites with only 2% being recovered as
nmetabolized drug. Azoreductase activity was
emonstrated in normal human liver and in human
one marrow and lymphoid cells. This latter find-
ng may explain the occurrence of myelosuppression
bserved in several patients. These data indicate
hat CB10-252 is not a hepatoma-selective alkylating
gent, but that the drug is well absorbed following
.o. administration.

825 BILIARY DISPOSITION OF ADRIAMYCIN. (Eng.)
Riggs, C. E., Jr.; Benjamin, R. S.; Ser-
ick, A. A.; Bachur, N. R. (Baltimore Cancer Res.
enter, 3100 Wyman Park Dr., Baltimore, MD 21211).
lin. Pharmacol. Ther. 22(2):234-241; 1977.

ne biliary disposition of adriamycin was studied in
patient with a choledochal T tube and normal liver
unction who was receiving adriamycin as therapy
or abdominal histiocytic lymphoma. Plasma, urine,
nd bile samples were collected after drug admin-
stration (195 μM). Adriamycin and its metabolites
ere extracted from the samples and separated by
hin-layer chromatography. The pharmacokinetics
f adriamycin and its metabolites in plasma and
rine resembled those of previous patients, with
plasma elimination half-life for adriamycin of
.2 hr. Bile contained adriamycin and 11 metab-
lites, 4 of which were not present in plasma or
rine. Forty-one percent of the administered dose
adriamycin appeared in the bile in 7 days; of
is amount, 42% was adriamycin, 22% was adria-
cinol, the major metabolite, and 36% was other
etabolites. Hepatic clearances of adriamycin
d adriamycinol showed early, rapid removal of
ug by the liver, with subsequent slowing of re-
val rate as plasma drug concentration declined.
riamycin was more efficiently cleared than
riamycinol by both liver and kidney. Disease
states that impair the capacity of the liver to excrete adriamycin may result in prolonged, high drug levels and increased toxicity.

5826 ON THE MECHANISM OF LANTHANIDE-INDUCED LIVER TOXICITY. (Eng.) Sarkander, H. I.; Brade, W. P. (Pharmakologisches Institut der Freien Universitat Berlin, Thielallee 69-73, D-1000 Berlin 33, W. Germany). *Arch. Toxicol.* 36(1):1-17; 1976.

The effect of various rare earths on *in vitro* nuclear RNA synthesis in rat liver was examined to elucidate whether the primary cause for the massive liver damage after i.v. injection of rare earths in rats was localized at the subcellular level on the nucleic acid metabolic system and/or its nuclear regulative mechanisms. The i.v. injection (in doses of 3.5 μmol/100 g body weight) of the lighter lanthanide ions (praseodymium [Pr], neodymium, and samarium) inhibited and the heavier lanthanide ions (gadolinium, dysprosium, and erbium) stimulated rat liver nuclear RNA synthesis catalyzed by RNA polymerase B as measured 24 hr after the *in vitro* application of the ions. However, nuclear RNA synthesis catalyzed by RNA polymerase A was inhibited by iso-osmolar doses of lighter lanthanides and not influenced by the heavier lanthanides. The effect of Pr applied *in vivo* on rat liver *in vitro* nuclear RNA synthesis showed a time- and dose-dependent pattern. Twenty-four hr after i.v. Pr administration (150 μmol/kg body weight), RNA polymerases A and B were inhibited to 39.1 ± 2.9% and 19.4 ± 3.7%, resp., of control values (0.8 ± 0.08 and 2.6 ± 0.1 pmoles uridine monophosphate [UMP] incorporated/μg DNA, resp.). This decreased RNA synthesis was accompanied by a decreased nuclear *in vitro* ^{3}H-acetate uptake by the chromatin-bound histone fractions. The capacity of and number of initiation sites of the rat liver nuclear template for nuclear RNA polymerases, measured in the presence of the actinomycin D-insensitive synthetic template poly (dA-dT), was lower (26.7 ± 2.9 disintegrations per min [dpm]/μg DNA, of ^{3}H-UMP incorporation) in nuclei isolated from rats treated 24 hr previously with Pr than in control nuclei (50.8 ± 4.7 dpm/μg DNA of ^{3}H-UMP incorporation). It is concluded that the number of initiation sites of the nuclear template is diminished by the Pr treatment. A primary ionic size-correlated interference of lanthanides with the nuclear control mechanisms of RNA synthesis is suggested.

5827 THOROTRAST INJURY IN JAPAN. STATISTICAL STUDY ON AUTOPSY CASES AND FOLLOW-UP STUDY ON 147 CASES. (Jpn.) Mori, T.; Maruyama, T.; Hatakeyama, S.; Miyaji, T.; Tsuya, A.; Takahashi, S. (Dept. Pathology, Kanagawa Prefectural Junior Coll. Nursing and Technology, Japan). *Nippon Acta Radiol.* 35(6):439-452; 1975.

The incidence of Thorotrast liver injury was studied in Japan. Since 1945, 94 autopsy cases of patients exposed to Thorotrast were accumulated; among these, there were 60 cases of malignant liver tumors and

9 cases of blood diseases. Since approximately half of these patients were ex-servicemen, 147 ex-servicemen who received Thorotrast 31-36 yr previously were followed up. Among these, there were six with liver malignancies, one with leukemia, one with thrombocytopenic purpura, and five with liver cirrhosis. The incidences of these diseases were significantly higher than in a control group.

5828 DIAGNOSIS AND TREATMENT OF NONPARASITIC LIVER CYSTS. (Rus.) Shalimov, S. A.; Rustamov, I. R.; Zemskov, V. S. (Samarkand Medical Inst., Samarkand, USSR). *Klin. Khir.* (6):29-32; 1977.

5829 EXPERIENCE WITH CLINICAL USE OF LYMPHSORPTION IN THE TREATMENT OF HEPATIC INSUFFICIENCY. (Rus.) Panchenkov, R. T.; Yarema, I. V.; Yatsenko, A. A.; Urtayev, B. M. (Moscow Inst. Medical Stomatology, Moscow, USSR). *Klin. Khir.* (6):42-46; 1977.

5830 ANGIOGRAPHY AND DIFFERENTIAL DIAGNOSIS OF MALIGNANT LIVER CELL TUMORS. (Ger.) Haertel, M.; Triller, J. (Inselspital, CH-3010 Bern, Switzerland). *Fortschr. Roentgenstr.* 127(1):9-15; 1977.

5831 ANGIOGRAPHIC FINDINGS IN BENIGN LIVER TUMORS. (Ger.) Taenzer, V.; Sorensen, R.; Pohl, J. (Krankenhaus Moabit, Abteilung fur Rontgendiagnostik, Turmstr. 21, 1000 Berlin 21, W. Germany). *Fortschr. Roentgenstr.* 127(1):16-18; 1977.

5832 HEMOPERITONEUM SECONDARY TO A RUPTURED ANEURYSM OF A GASTROINTESTINAL ARTERY: REPORT OF TWO CASES. (Fre.) Izard, G. (Service de Chirurgie digestive, C.H.U. Toulouse Rangueil, Chemin du Vallon, 31052 Toulouse Cedex, France). *Chirurgie* 103(6):400-406; 1977.

5833 ENCYSTED VESICULAR PERITONEAL ECHINOCOCCOSIS ASSOCIATED WITH SUBTOTAL DESTRUCTION OF THE LIVER BY THE PRIMARY CYST: REPORT OF ONE CASE. (Fre.) Reynaud, B.; Amoros, J. P.; Kadji, H. (Centre Hospitalier d'Ajaccio, 20000 Ajaccio, France). *Chirurgie* 103(6):413-418; 1977.

5834 ECHINOCOCCOSIS OF THE LIVER. (Rus.) Dederer, Yu. M.; Krylova, N. P. (Altai Medical Inst., USSR). *Khirurgiia* (7):25-28; 1977.

5835 SURGICAL REMOVAL OF HEPATIC METASTASES FROM GASTROINTESTINAL CANCERS: REPORT OF 19 CASES. (Fre.) Marchal, G.; Clauss, B.; Vernette, M. (72 bis rue de Lodeve, 34000 Montpellier, France). *Lyon Chir.* 73(2):100-105; 1977.

5836 THE VALUE OF SELECTIVE ANGIOGRAPHY IN THE DIAGNOSIS OF PRIMARY HEPATIC CARCINOMA. (Pol.) Furman, W.; Milewski, B. (Klinika Gastroenterologii i Przemiany Materii CMKP, 02-616 Warszawa, ul. Goszczynskiego 1, Poland). *Pol. Przegl. Radiol. Med. Nukl.* 41(2):127-130; 1977.

5837 REPORT ON BILIOBRONCHIAL FISTULA. (Ger.) Szinicz, G.; Riedler, L.; Salzer, G. M. (Chirurg. Univ.-Klinik Innsbruck, Anichstrasse 35, A-6020 Innsbruck, Austria). *Langenbecks Arch. Chir* 344(1):27-30; 1977.

5838 INTERPRETATION OF UPTAKE DEFECTS IN LIVER SCINTISCANNING. (Ita.) Ponz de Leon, M. Piaggi, W.; Boraldi, F.; Carulli, N. (Istituto di Clinica Medica dell'Universita Modena, Modena, Italy). *Minerva Med.* 68(37):2557-2266; 1977.

5839 RADIOISOTOPE DIAGNOSIS OF FOCAL LIVER DISEASES. (Rus.) Kasatkin, Yu. N.; Mironov, S. P.; Vidyukov, V. I.; Maksumov, D. D.; Larina, E. V. (Central Inst. Postgraduate Medicine Moscow, USSR). *Ter. Arkh.* 49(8):20-24; 1977.

5840 FUNCTIONAL AND MORPHOLOGICAL CHANGES IN THE LIVER IN ACUTE DIFFUSE PERITONITIS. (Rus.) Zhavoronkova, L. P. (Yaroslavl Medical Inst., Yaroslavl, USSR). *Vestn. Khir.* 119(8): 21-27; 1977.

5841 POLYCYSTIC LIVER: REPORT OF ONE CASE AN ITS THERAPY. (Fre.) Teniere, P.; Michot, F.; Testart, J.; Watelet, J. (Centre Hospitalier regional, 1, rue Germont, 76000 Rouen, France). *J. Chir. (Paris)* 113(2):153-158; 1977.

See also, 5396, 5397, 5463, 5479, 5484, 5487, 5497
5514, 5515, 5516, 5524, 5525, 5531, 5534
5535, 5545, 5546, 5549, 5553, 5554, 5614
5644, 5763, 5780, 5844, 5882, 5906, 5927
5929, 5949, 5950, 5955, 5965, 5972, 5975

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

5842 NEONATAL HYPERBILIRUBINEMIA: A COMPARISON BETWEEN PROSTAGLANDIN E_2 AND OXYTOCIN INDUCTIONS. (Eng.) Chew, W. C. (Queen Elizabeth Hosp., Kota Kinabulu, Sabah, Malaysia). *Br. Med. J.* 2(6088):679-680; 1977.

The incidence of neonatal hyperbilirubinemia was compared in infants of mothers in whom labor had been induced with oxytocin with that in those induced with prostaglandin E_2 (PGE_2). Forty-five mothers received PGE_2 p.o. (0.5-1 mg/hr) following amniotomy, and 45 received simultaneous low otomy and an i.v. oxytocin infusion. Controls isted of 45 women whose labor was spontaneous. mean serum bilirubin concentrations of infants vered after induction with oxytocin were sig- cantly higher ($p<0.01$) on the first, third, and n days postpartum (45.3 ± 10.2, 145.6 ± 47.0, 129.7 ± 48.5 μM, resp.) than the concentrations he infants delivered after spontaneous labor 0 ± 9.5, 94.0 ± 32.6, and 81.2 ± 32.6 μM, resp.). e was no significant difference ($p>0.05$) be- n the mean bilirubin levels in the infants of ers treated with PGE_2 and those in the infants others in whom labor was spontaneous. Using a n bilirubin level of less than 205 μM as within al limits in the neonatal period, elevated rubin levels occurred in 4%, 13%, and 2% of the nts of PGE_2-treated mothers, oxytocin-treated ers, and spontaneous mothers, resp. Induction abor with PGE_2 does not seem to carry the risk eonatal jaundice that oxytocin does.

BILIRUBINEMIC "REBOUND" AFTER PHOTOTHERAPY: IS IT A PROBLEM? (Ita.) Romagnoli, Pesaresi, M. A.; Polidori, G.; De Turris, P.; ldi, L. (Universita Cattolica del Sacro Cuore, Istituto di Clinica Pediatrica, Rome, Italy). *rva Pediatr.* 29(6):353-356; 1977.

A study was made of 73 low-birth-weight neonates being treated with phototherapy for bilirubinemia. Treatment was started within 12 hr of birth and continued for 4-6 days. Fifty-one percent of the infants treated for 4 days and 21% of those treated for 5 days had a rebound of bilirubinemia when treatment was stopped. Only 31% of those treated for 6 days had such a rebound. Rebound was directly related to gestational age as well as to length of treatment. It is suggested that treatment be continued for at least 6 days and perhaps longer in infants of very young gestational age. Caution is recommended in all cases, and bilirubinemia should be monitored for several days after the suspension of treatment.

5844 WHY HYPERBILIRUBINEMIA AND HYPOALBUMINEMIA PREDISPOSE TO STEROID SIDE EFFECTS DURING TREATMENT OF CHRONIC ACTIVE LIVER DISEASE (CALD) [Abstract]. (Eng.) Uribe, M.; Summerskill, W. H. J.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5):1143; 1977.

5845 HIGH FREQUENCY OF GILBERT'S DISEASE AMONG PATIENTS WITH GALLSTONES [Abstract]. (Eng.) Duvaldestin, P.; Metreau, J. M.; Preaux, A. M.; Berthelot, P. (Hopital Henri-Mondor, Creteil, France). *Digestion* 14(5/6):469-470; 1976.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

LIVER TOXICITY AFTER ACETAMINOPHEN INGESTION: INADEQUACY OF THE DOSE ESTIMATE INDEX OF RISK. (Eng.) Ambre, J.; Alexander, niv. Iowa Hosp., Iowa City, IA 52242). *JAMA*):500-501; 1977.

isk of hepatic necrosis was assessed in five nts who had taken an overdose of acetaminophen; ase reports are presented. The patients re- d that they had taken 10-50 g of acetaminophen. er, the plasma levels at the time of admission, the induction of emesis, or after the admin- tion of activated charcoal, were less than 5 to 20 μg/ml in three patients. In one of emaining patients, the level after charcoal istration was 150 μg/ml, and the acetaminophen life was estimated to be 1.75 hr. The level 3 μg/ml in the fifth patient, the half-life 2 hr. Antidotal therapy was instituted with lcysteine (7.5 g) in only one patient, because the plasma acetaminophen level had been miscalculated to be 200 μg/ml. Hepatotoxicity did not occur in any patient. It appears that estimating the dose of acetaminophen ingested is inadequate as an index of the risk of hepatotoxicity and that the measurement of plasma acetaminophen levels is a much more reliable index of the amount actually absorbed.

5847 HEPATOTOXICITY OF DEXTROPROPOXYPHENE. (Eng.) Lee, T. H.; Rees, P. J. (Guy's Hosp., London SE1, England). *Br. Med. J.* 2(6082):296-297; 1977.

The cases of two patients with dextropropoxyphene-induced liver damage are presented. The first patient, a 56-yr-old man, experienced recurrent episodes of jaundice for 5 yr, during which time his usual analgesic was codeine. Ten days after first taking Distalgesic (dextropropoxyphene, 32.5 mg + paracetamol, 325 mg), he developed jaundice, dark urine, pale stools, and abdominal pain. This occurred after two further exposures to the analgesic, and there was a decrease in the time between exposure and the appearance of symptoms. When he was challenged with 130 mg of dextropropoxyphene, he developed the same symptoms within 24 hr, with associated abnormal liver function tests. Subsequent exposure to paracetamol alone was uneventful. The second patient, a 66-yr-old woman who was receiving thyroxine, cyclopenthiazide, and potassium chloride in addition to Distalgesic, reported feeling tired 1 month after the institution of therapy; the liver function tests were abnormal. The symptoms resolved 5 days after discontinuing the analgesic. When challenged with 130 mg dextropropoxyphene, she developed the same symptoms within 24 hr. The decrease in time between exposure to Distalgesic and abnormal liver function with repeated exposures and the relatively small dose of dextropropoxyphene required to reproduce the changes suggest a sensitivity reaction. The episodes of jaundice occurring during 5 yr in the first patient may have been due to cross-sensitivity to codeine.

5848 DISULFIRAM HEPATOTOXICITY. (Eng.) Ranek, L.; Andreasen, P. B. (Righospitalet, DK-2100 Copenhagen, Denmark). *Br. Med. J.* 2(6079):94-96; 1977.

The cases of six alcoholic patients who developed liver damage after the institution of aversion therapy with disulfiram are presented. The patients had been treated with disulfiram (200 mg/day) for 2 weeks to 6 months before the onset of symptoms. Only one patient had liver disease when disulfiram treatment was started. All but one patient died in hepatic coma; in the remaining patient, hepatitis due to disulfiram was confirmed by a challenge test. A liver biopsy 5 days later showed portal enlargement with infiltration of inflammatory cells and eosinophil leukocytes and focal necrosis in the parenchyma. The symptoms of anorexia, vomiting, abdominal pain, and fever lasted for 6 days. Liver biopsies 5 and 11 yr later were normal. In the other five patients, necropsy revealed a small liver with liver cell necrosis and fibrosis. These findings indicate that long-term toxicity studies in animals should be carried out to detect possible liver damage after prolonged administration of disulfiram.

5849 DRUG-INDUCED LIVER CELL GRANULOSIS (BASED ON TWO CASES). (Heb.) Litvin, I.; Brotver, N. (Hadassah Hosp., Jerusalem, Israel). *Harefuah* 89(10):474-475; 1975.

5850 TOXIC LIVER DYSTROPHY DUE TO UNCONTROLLED USE OF AQUEOUS ALDER TINCTURE. (Ukr.) Yanchuk, N. Ya; Samchuk, E. O. (Rovny Oblast Hosp., USSR). *Pediatr. Akush. Ginekol.* (3):21-22; 1977.

See also, 5798.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

5851 THE EFFECT OF 1-β-D-RIBOFURANOSYL-1,2,4-TRIAZOLE-3-CARBOXAMIDE ON ACUTE VIRAL HEPATITIS. (Eng.) Ayrosa-Galvao, P. A.; Castro, I. O. (ICN Pharmaceutical, Inc., Irvine, CA 92715). *Ann. N.Y. Acad. Sci.* 284:278-283; 1977.

A double blind study was conducted to verify the therapeutic action of 1-β-D-ribofuranosyl-1,2,4-triazole-3-carboxamide (ribavirin) during the first 10 days of treatment of acute viral hepatitis. Among 66 patients studied, 33 were randomized to receive one capsule of ribavirin (0.100 g) every 6 hr for 10 consecutive days, while another 33 patients received capsules of placebo on the same schedule. On the day before capsule administration, the total (STB) and direct (SDB) bilirubin, SGOT, and SGPT values were 12.40 mg/100 ml, 8.42 mg/100 ml, 1,286.00 IU/ml, and 1,184.12 IU/ml, resp., for patients randomized to receive ribavirin; the values for patients randomized to receive the placebo were 9.86 mg/100 ml, 6.28 mg/100 ml, 1,111.35 IU/ml, and 1,056.70 IU/ml, resp. The STB values i the ribavirin group declined a total of 36% ($p<0.0$ by day 5 of treatment as compared with 25.4% ($p<0.$ for the placebo group; by day 10, the ribavirin group showed a 58.5% decline ($p<0.01$), as compared with 39.6% ($p>0.05$) for the placebo group. Simila ly, SDB values were reduced by 37.0% ($p<0.01$) and 19.0% ($p>0.05$) by day 5 and by 60.0% ($p<0.01$) and 36.0% ($p>0.05$) by day 10 in the ribavirin and placebo groups, resp. SGOT was reduced by 60.0% ($p<0.01$) and 50.0% ($p<0.01$) by day 5 and 78.0% ($p<0.01$) and 55.0% ($p>0.05$) by day 10 in the ribavirin- and placebo-treated patients, resp. SGPT

els were reduced 54% ($p < 0.01$) and 42.0% ($p < 0.05$)
day 5 and 77.0% ($p < 0.01$) and 55.0% ($p > 0.05$) by
10 in the ribavirin and placebo groups, resp.
se data indicate that the rate of recuperation
significantly increased in patients treated with
avirin, especially after the 5th day of treatment.
effects of ribavirin on human viral hepatitis
presumed to be due to a direct antiviral action,
ce this drug has significant effects on viral
ections both *in vitro* and in laboratory animals.

2 COENZYME-B_{12} THERAPY IN ACUTE VIRAL HEPATITIS.

(Eng.) Iwarson, S.; Lind-
g, J. (Ostra Sjukhuset, S-41685 Goteborg, Sweden).
nd. J. Infect. Dis. 9(2):157-158; 1977.

therapeutic effect of coenzyme-B_{12} in hepatitis
as compared with that of hydroxycobalamin in two
ups of patients from the same epidemic of short
ubation hepatitis A. Twenty patients received
roxycobalamin (1 mg/day, i.v., 12 days followed
mg/day, p.o., until a total period of 35 days).
nty patients received the same dose levels of
nzyme-B_{12} for the same periods. At the second,
rd, fourth, and fifth weeks after the onset of
ndice, the serum SGPT levels were abnormal (>25
in 90%, 70%, 30%, and 15% of the coenzyme-
ted patients, resp., while the same values in
cyanocobalamin-treated group were 100%, 80%,
and 35%. The SGOT levels in the coenzyme-
ted group were 80%, 30%, 20%, and 10%, resp., and
50%, 40%, and 30% in the cyanocobalamin-treated
p. The results show that aminotransferase lev-
of the patients treated with coenzyme-B_{12} tended
ormalize more rapidly than those of the patients
ted with cyanocobalamin. A statistically sig-
cant difference in the SGOT level appeared in
fourth week ($p < 0.05$) between the two groups.
zyme-B_{12} may have clinical value in the treat-
of viral hepatitis.

THERAPY OF VIRAL HEPATITIS B. PRACTICAL CONSEQUENCES.

(Ger.) Kuhn, H. A. (Med-
sche Universitatsklinik, D-8700 Wurzburg, W.
ny). *Schweiz. Med. Wochenschr.* 107(15):514-
1977.

onspecific general therapy, drug treatment and
otherapy of viral hepatitis is discussed.
ally, in uncomplicated courses of hepatitis A
bed rest and isolation are recommended.
ment with prednisone and corticoids has resul-
n a rapid drop in serum bilirubin concentra-
and a decrease in transaminase values. How-
the rate of B hepatitis carriers has been
ted possibly to be greater after corticoid
py. The effectiveness of glucocorticoids in
nant hepatitis is still controversial and may
d on early drug administration. Of 58
nts that were treated with hepatitis B
ce antigen (HBsAg)-rich human serum for
nant hepatitis B, 24 survived. On the other
the administration of azathioprine with glu-
ticoids is highly effective in chronic active
tis regardless of the presence of HBsAg in

the plasma. The best results have been noted in patients with lupoid hepatitis. The use of transfer factor, levamisole, or thymosine to suppress T-cell action on antibody production of the B cells has not been fully evaluated in treating chronic active hepatitis. Overall, prophylaxis is important in hepatitis B infections. Recent studies with active immunization with vaccines from HBsAg-rich sera or of purified formalin-inactivated HBsAg preparations suggest the possibility of successful prophylaxis against hepatitis B. However, suitable culture media for the virus must be found so that a sufficient quantity of vaccine can be produced.

5854 POSSIBILITIES FOR THE EVALUATION OF THE INFECTIVITY OF HBsAG-POSITIVE PERSONS.

(Ger.) Stalder, G. A. (Medizinische Universitats-Poliklinik, Hebelstrasse 1, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(18):614-617; 1977.

The possibility of deducing the risk of infection of contacts by subjects with hepatitis B surface antigen (HBsAg)-positive blood is discussed. Only blood containing the virion formed from HB core antigen (HBcAg) and HBsAg (DANE particles) is infective. DANE particles have been found in patients with chronic aggressive and other forms of hepatitis all belonging to the HBc+s-type. The blood of HBsAg-positive patients receiving immunosuppressive therapy contains DANE particles and is considered highly infectious. However, since a patient can be clinically asymptomatic, a light-microscopic evaluation of the liver is recommended in an HBsAg carrier. In chronic aggressive or acute hepatitis, treatment with prednisone or with Imuran results in clinical and histological improvement of the liver, although it may increase the production of DANE particles. Few or no DANE particles are found in patients with spontaneous acute hepatitis B. The relation of the HBs- and HBc-antigen-antibody system has also been studied, and the role of DNA polymerase, HBc-antigen, or e-antigen in providing data on the infectivity of HBsAg blood has yet to be elucidated.

5855 PASSIVE IMMUNIZATION AGAINST EXPOSURE TO HEPATITIS B VIRUS IN THE MILITARY: POTENTIAL AND POSSIBILITIES.

(Eng.) Irwin, G. R. (Walter Reed Army Medical Center, Washington, DC 20012). *Yale J. Biol. Med.* 49(3):251-257; 1976.

The value of standard γ-globulin with a low titer of antibody to hepatitis B surface antigen (anti-HBs) versus hepatitis B immune globulin (HBIG) in prevention of icteric hepatitis B in the military is reviewed. Although recent studies have shown a decrease in icteric hepatitis after administration of both types of γ-globulin in populations where acquisition of hepatitis B virus (HBV) is most likely the result of nonparenteral transmission, the data pertaining to parenteral exposure suggest that HBIG delays the incubation period of HBV and decreases the the incubation period of HBV and decreases the development of passive-active immunity. Since no studies have demonstrated the efficacy of standard γ-globulin or HBIG in a drug-using population where multiple HBV exposures are likely, the results observed in most trials are not comparable to hepatitis B associated with drug abuse in the military. The attack rate of HBV in U.S. Army Divisions in Germany was reported to be 12-15/1,000 in 1975. Illicit drug use is reported as the major reason for increasing hepatitis rates in the U.S. Army. Therefore, it is suggested that, before a recommendation for use of routine γ-globulin or HBIG can be made for drug-related hepatitis in the military, the efficacy of standard γ-globulin and/or HBIG should be demonstrated in this population.

5856 DISPARATE RESPONSE OF MONOZYGOTIC TWINS TO HEPATITIS B VIRUS INFECTION. (Eng.)

Peters, C. J.; Reeves, W. C.; Purcell, R. H. (Sch. Public Health and Community Medicine, SC-36, Univ. Washington, Seattle, WA 98195). *J. Pediatr.* 91(2): 265-266; 1977.

The cases of monozygotic twins who were discordant for hepatitis B antigenemia are presented. One twin developed hepatitis at the age of 10 yr. Two weeks after the onset of symptoms, his serum did not contain hepatitis B surface antigen (HBsAg) when tested by gel diffusion, counterelectrophoresis, complement fixation, or radioimmunoassay. However, antibody to HBsAg (anti-HBs) was detected by radioimmunoprecipitation. His serum IgM concentration was 437 IU/ml in the initial sample and had decreased to 135 IU/ml 4 weeks later. Subsequent tests for HBsAg and anti-HBs performed 1 month and 2 yr later gave identical results. The patient's identical twin had serum HBsAg detectable by complement fixation, counterelectrophoresis, and gel diffusion. His HBsAg persisted through 2 yr at a complement fixation titer of 1:512. The propositus probably suffered from hepatitis A, as anti-HBs is not usually detectable by radioimmunoassay 2 weeks after the onset of hepatitis B; in addition, the high IgM level suggests hepatitis A infection. The data support the contention that two genetically identical human beings have encountered HBsAg with chronic antigenemia resulting in one and an antibody response in the other. This observation supports open population studies that indicated that the interactions between host genome and a variety of epidemiologic factors ultimately determine the chronic carrier state.

5857 NEONATAL HEPATITIS IN FIVE CHILDREN OF A HEPATITIS B SURFACE ANTIGEN CARRIER WOMAN.

(Eng.) Mollica, F.; Musumeci, S.; Fischer, A. (Clinica Pediatrica Universita, Viale A. Doria, 95125 Catania, Italy). *J. Pediatr.* 90(6):949-950; 1976.

The transmission of hepatitis from an asymptomatic hepatitis B surface antigen (HBsAg)-positive mother to her six children during a 22-yr period is reported. Four infants developed symptoms of hepatitis at the age of 1-2 months and died at the ages of 38-75 days. One child had an uneventful neonatal period and is in good health at 22 yr of age; he was found to have persistent HBsAg antigenemia. Th sixth-born child developed hepatitis at 2.5 months. After receiving a total of 520 ml of ABO compatible fresh plasma from three donors who had recently had hepatitis B, and that contained high titers of antibodies to HBsAg, clinical improvement and a decrease in serum bilirubin values to normal ensued The child is clinically well at age 3.5 yr, and no jaundice or antigenemia is present. This case study shows that an asymptomatic HBsAg carrier mother may transmit the antigen, and consequently the disease, to successive children for as long as 22 yr. The authors believe that infusions of hepatitis B immune plasma might have contributed to the favorable evolution of the disease in the sixth child.

5858 HEPATITIS B SURFACE ANTIGEN AND CHRONIC HEPATITIS IN INFANTS BORN TO ASYMPTOMATIC CARRIER MOTHERS.

(Eng.) Shiraki, K.; Yoshihara, N.; Kawana, T.; Yasui, H.; Sakurai, M. (Dept. Pediatrics, Univ. Tokyo, 7-3-1 Hongo, Bunkyo-ku, Toky 113, Japan). *Am. J. Dis. Child.* 131(6):644-647; 1977.

Twenty-three infants born to asymptomatic hepatiti B surface antigen (HBsAg) carrier mothers were followed up to determine whether hepatitis B virus is transmitted vertically from these mothers. Four infants became positive for HBsAg within 4 months after birth. Three showed hepatic dysfunction; liver biopsy specimens demonstrated mild chronic hepatitis in one and persistent hepatitis in another. In six infants followed up for more than 6 months after birth, antibody to HBsAg (anti-HBs) without antigenemia was detected. Antigenemia of cord blood strongly suggested that hepatitis B viral infection of the infant would occur. HBsAg was also demonstrated in breast milk by radioimmun assay in three of nine cases. These findings indi cate that vertical transmission of hepatitis B virus occurs in many infants born to asymptomatic HBsAg carrier mothers, and that some of them becom persistent carriers or develop chronic hepatitis without showing any signs suggesting hepatic involvement.

5859 ETIOLOGY OF SPORADIC HEPATITIS B SURFACE ANTIGEN-NEGATIVE HEPATITIS. (Eng.)

Dienstag, J. L.; Alaama, A.; Mosley, J. W.; Redeke A. G.; Purcell, R. H. (Massachusetts General Hosp. Boston, MA 02114). *Ann. Intern. Med.* 87(1):1-6; 1977.

The etiology of 45 cases of sporadic acute viral hepatitis B surface antigen (HBsAg)-negative hepa was investigated. Two cases were due to hepatiti virus, as demonstrated by the appearance of antib to hepatitis B core antigen. In three other pati the serologic pattern was inconclusive. Of 40 no cases, 20 were type A hepatitis and 20 were non-A non-B hepatitis. Clinically, type A and non-A, n hepatitis were indistinguishable; one case of ful nant disease occurred in each group. The type A cases were more frequent in young adults; non-A, disease predominated in women 35 yr or older. Ep

lemiologic backgrounds were similar, including illi-
:it self-injection; but four transfusion-associated
:ases were limited to the non-A, non-B group. It is
:oncluded that relatively few HBsAg-negative cases
ıre due to hepatitis B virus, and that hepatitis A
irus and non-A, non-B viruses are both important in
ıcute non-B disease.

860 MONONUCLEAR CELL MIGRATION TEST WITH
MITOCHONDRIAL ANTIGENS IN HBsAg ACUTE
EPATITIS. (Eng.) Bianchi, F. B.; Zauli, D.;
archesini, G.; Pisi, E. (Istituto di Patologia Spe-
iale Medica I, Policlinico S. Orsola, Via Massarenti,
, 40100 Bologna, Italy). *Rend. Gastroenterol.* 9
1):1-3; 1977.

he leukocyte migration inhibition (LMT) test was car-
ied out in the mononuclear cells and the polymorphs
f 10 patients who were positive for acute hepatitis
surface antigen (HBsAg). Migration of lympho-
ytes was inhibited by the presence of human fetal
iver mitochondria (57.5 or 115 µg/ml) in 7 of the
) patients. The total leukocytes were inhibited
ı 8% of the cases by 57.5 µg/ml of the antigen,
ıd in 19% of the cases by 115 µg/ml. The poly-
ırphs showed no response. This study suggests that
ıe mononuclear cells respond in LMT tests of HBsAg-
ısitive hepatitis.

61 LOCALIZATION OF HBc-Ag AND HBs-Ag IN THE
LIVER TISSUE. (Jpn.) Yoshizawa, H.;
ta, G.; Sugioka, G.; Sugimoto, T. (Sch. Medicine,
nazawa Univ., Japan). *Jpn. J. Gastroenterol.* 73
):22-30; 1976.

e localization of intrahepatic hepatitis B core
tigen (HBcAg) and hepatitis B surface antigen
BsAg) was examined by an immunofluorescent anti-
dy technique and by electron microscopy in tissue
om 29 patients with acute hepatitis, 49 with
ronic active hepatitis, 22 with chronic inactive
patitis, 22 with liver cirrhosis, 7 with hepatoma
d liver cirrhosis, 19 asymptomatic antigen car-
ers, and 7 with normal liver. HBcAg was detected
ly in the hepatocyte nuclei, but HBsAg was found
the cytoplasm, using the immunofluorescent anti-
dy technique. In all of nine livers with intra-
clear fluorescence specific for HBcAg, core-like
rticles were detected in the hepatocyte nuclei
ing electron microscopy. Aggregates of core-like
rticles were isolated from tissue in which many
cAg-positive nuclei were detected by immunofluo-
scent microscopy. The intranuclear core-like
rticles may represent HBcAg.

52 THE PROTEINS OF HEPATITIS B DANE PARTICLE
CORES. (Eng.) Hruska, J. F.; Robinson,
S. (Stanford Univ. Sch. Medicine, Stanford, CA
05). *J. Med. Virol.* 1(2):119-131; 1977.

peptides of the hepatitis B Dane particle cores
e studied. Dane particles and Dane particle
es (produced by NP-40 treatment of Dane particles)
e purified by equilibrium centrifugation in CsCl density gradients. Two populations of Dane particles were observed at densities 1.27 and 1.24 g/ml, resp. The higher buoyant density Dane particles yielded exclusively cores of buoyant density of 1.38 g/ml in CsCl, and the lower buoyant density Dane particles yielded two kinds of cores with buoyant densities of 1.38 and 1.325 g/ml, resp. Only the higher density Dane particles and cores manifested endogenously primed DNA polymerase activity. The peptides of density 1.38 g/ml Dane particle cores purified by equilibrium CsCl density gradient centrifugation and hepatitis B core antigen (HBcAg) particles from hepatitis B virus (HBV)-infected chimpanzee liver purified in the same way were analyzed by sodium dodecyl sulfate polyacrylamide gel electrophoresis. Both kinds of particles were found to consistently contain 3 Coomassie blue staining peptides, with approximate molecular weights of 19,000, 70,000, and 80,000 daltons (designated P-19, P-70, and P-80, resp.). In addition, the HBcAg particles from infected liver regularly yielded a protein component with molecular weight greater than 200,000 daltons. This component was occasionally present in electrophoresis runs of core peptides from only one of two patients. Its irregular appearance after gel electrophoresis suggests that it may have been an aggregate not completely dissociated under the conditions used. The lower density core component consistently contained P-19, P-70, and P-80, and infrequently, additional minor peptides of uncertain origin. The irregular occurrence of the minor peptides in varying amounts suggests they were not intrinsic core proteins.

5863 ASSOCIATION OF e ANTIGEN WITH DANE PARTICLE DNA IN SERA FROM ASYMPTOMATIC CARRIERS OF HEPATITIS B SURFACE ANTIGEN. (Eng.) Werner, B. G.; O'Connell, A. P.; Summers, J. (Fox Chase Cancer Center, Philadelphia, PA 19111). *Proc. Natl. Acad. Sci. U.S.A.* 74(5):2149-2151; 1977.

The prevalence of the e antigen (HBeAg) was determined in 30 asymptomatic hepatitis B surface antigen (HBsAg) carriers, and the hypothesis that HBeAg is a marker of potential hepatitis B virus infectivity was tested. Fourteen samples (47%) had HBeAg detectable by rheophoresis, 10 (33%) had antibody to HBeAg (anti-HBe), and 6 (20%) had neither. DNA was extracted from 26 of these sera and assayed for its ability to anneal to a [^{32}P]-DNA probe that is a copy of Dane particle DNA. All 10 HBeAg-positive samples tested contained DNA that formed specific hybrids with the DNA probe, as did 1 of 10 anti-HBe-positive samples. Hybridization was not detected in nine sera containing anti-HBe and six sera without HBeAg or anti-HBe. Because the Dane particle is thought to be the hepatitis B virus, this association between HBeAg positivity and Dane particle DNA supports the hypothesis that e antigen is a marker of the presence of the virus and, consequently, potential infectivity.

5864 CORRELATION OF e ANTIGEN, DNA POLYMERASE ACTIVITY, AND DANE PARTICLES IN CHRONIC

BENIGN AND CHRONIC ACTIVE TYPE B HEPATITIS INFECTIONS.
(Eng.) Tong, M. J.; Stevenson, D.; Gordon, I. (Rancho Los Amigos Hosp., 12733 Erickson Ave., Downey, CA 90242). *J. Infect. Dis.* 135(6):980-984; 1977.

The relationship between the e antigen, DNA polymerase activity, and Dane particles was investigated in 42 hepatitis B surface antigen (HBsAg) carriers with persistent viral hepatitis or chronic active type B hepatitis. The e antigen occurred in 23 of the 42 subjects. The presence of e antigen was associated with increases in DNA polymerase activity and in the number of circulating Dane particles. In the group with detectable e antigen, the average DNA polymerase activity was 367 ± 78 counts/min (cpm), and the average number of Dane particles counted in electron micrographs was 4.4% of the total HBsAg. In contrast, e antigen-negative patients had an average DNA polymerase activity of 40 ± 6.9 cpm ($p<0.1$) and an average Dane particle count equal to 0.6% of the HBsAg carriers or had persistent viral hepatitis and 40% of those with chronic active type B hepatitis. Thus, the presence of e antigen correlated with both the chronicity and presence of infectious HBV. However, it did not correlate with the type or severity of liver disease after HBV infection, since e antigen was present in both chronic benign and chronic aggressive hepatitis B infections.

5865 ANTIBODIES TO HEPATITIS B CORE ANTIGEN IN HEPATITIS B SURFACE ANTIGEN-POSITIVE AND -NEGATIVE CHRONIC HEPATITIS.
(Eng.) Gerber, M. A.; Zappi, T.; Vernace, S. J.; Paronetto, F. (Mount Sinai Sch. Medicine, Fifth Ave. and 100th St., New York, NY 10029). *J. Infect. Dis.* 135(6):1006-1009; 1977.

The possibility that antibody to hepatitis B core antigen (anti-HBc) is a marker of hepatitis B virus (HBV) infection in patients with chronic hepatitis was studied. One hundred twenty-four sera from 67 patients with histologically proven chronic hepatitis were tested by the indirect fluorescent antibody technique. All patients, except for one with chronic hepatitis who was seropositive for hepatitis B surface antigen (HBsAg), had anti-HBc that persisted throughout the follow-up period (3 months-3 yr). Of 33 HBsAg-seronegative patients, anti-HBc was detected in 7 and persisted for 6 months to 2 yr. These findings suggest that 21% of patients with chronic hepatitis with undetectable amounts of HBsAg in the serum had evidence of recent or continued HBV replication.

5866 HEPATITIS B CIRCULATING IMMUNE COMPLEXES. CHARACTERIZATION BY RADIOIMMUNOPRECIPITATION-PEG ASSAY (RIPEGA).
(Eng.) Santoro, F.; Wattre, P.; Dessaint, J. P.; Capron, A. (Service d'Immunologie et de Biologie Parasitaire, Faculte de Medecine, Place de Verdun and Institut Pasteur de Lille, 20, boulevard Louis XIV, 59012 Lille cedex, France). *J. Immunol. Methods* 15(3):201-209; 1977.

The incidence of circulating immune complexes (IC) in carriers of hepatitis B antigen (HBAg) and/or anti-HB antibodies (anti-HBAb) was investigated using the three methods: a radioiodinated C1q binding test (C1q-BT), a complement fixation test, and optical density measurement after dissolution of a 3% polyethylene glycol (PEG) precipitate of the test serum. A highly significant correlation ($p<0.001$) was found between the three techniques. The level of circulating IC was significantly higher in carriers of HBAg and/or anti-HBAb than in normal control subjects, with more than 70% of the carriers having circulating IC levels higher than controls. Carriers of HBAg without detectable anti-HBAb had IC levels higher than those of patients with detectable anti-HBAb ($p<0.001$). The characterization of HBAg and anti-HBAb in IC was performed using a radioimmunoprecipitation-PEG assay (RIPEG). This sensitive and reproducible test was performed by incubation of ^{125}I-HBAg or ^{125}I-anti-HBAb with a 3% precipitate of the carrier's sera. Separation of free from complexed ^{125}I-HBAg or ^{125}I-anti-HBAb was achieved by PEG precipitation. A significant correlation was observed between the levels of HBAg or anti-HBAb in 3% PEG precipitates and the quantities of circulating IC ($p<0.001$) as determined by C1q-BT. When RIPEG was used to quantify HBAg and anti-HBAb in the sera of HBAg or anti-HBAb carriers and normal subjects, the mean values for the precipitation of ^{125}I-HBAg and ^{125}I-anti-HBAb for control subjects (5.1 ± 1.3 and 5.5 ± 1.1%, resp.) were lower than those for carriers of HBAg without anti-HBAb (6.8 ± 1.9 and 21.4 ± 11%, resp.) or carriers of anti-HBAb without HBAg (27.2 ± 17.6 and 7.7 ± 2.6%, resp.). RIPEG appeared to be more sensitive than classical radioimmunoassay for detecting serum HBAg and anti-HBAb.

5867 ACUTE HEPATITIS: SIGNIFICANCE OF CHANGES IN COMPLEMENT COMPONENTS.
(Eng.) Charle worth, J. A.; Lawrence, S.; Worsdall, P. A.; Roy, L. P.; Boughton, C. R. (Prince Henry Hosp., Little Bay, N.S.W. 2036, Australia). *Clin. Exp. Immunol.* 28(3):496-501; 1977.

Serial measurements of complement components were carried out in 59 patients with acute, uncomplicated hepatitis and 12 with alcoholic cirrhosis. Thirty-one hepatitis patients had detectable hepatitis B antigen. Abnormal complement profiles were observed in nine patients with hepatitis B and seven with antigen-negative hepatitis. Low levels of C4, C3, and factor B were common in the subjects with cirrhosis and confined to those cases with severe reduction in serum albumin and/or prothrombin index. The complement changes in the patients with hepatitis occurred without significant alteration in these parameters; certain subjects also had reduction in C1q and C5, and a significant number had C3d detectable in fresh plasma. The pattern of abnormality suggests predominant involvement of the classical pathway, and this may result, at least in part, from an immune process evident only in the early clinical phase of hepatitis. Such gross changes in complement are likely to reflect immune-complex activity, and these complexes may be im-

tant in the clearance of virus material. The
a support a previous suggestion that recovery
m acute hepatitis is primarily dependent on
t immune competence rather than viral cytotox-
ty or generation of immune complexes.

8 HLA-A1, B8-PHENOTYPE ASSOCIATION AND HBs
ANTIGENEMIA EVOLUTION IN 440 HEMODIALYZED
IENTS. (Eng.) Descamps, B.; Jungers, P.; Naret,
Degott, C.; Zingraff, J.; Bach, J. F. (Hopital
ker, Unite 25 Inserm, F-75730 Paris Cedex, France).
estion 15(4):271-277; 1977.

determine whether there is a greater immune
ponse in patients able to eliminate hepatitis B
face antigen (HBsAg) and to study the possible
ation between HBsAg antigenemia and the develop-
t of active chronic hepatitis, the sera of 440
odialyzed patients was tested by electroimmuno-
fusion and radioimmunoassay monthly for the pre-
ce of HBsAg. The sera were typed for 26 histo-
patibility antigen (HLA) alleles of the A and B
i. An abnormally high rate of the HLA-A1,B8
ociation (18.6%) was found in patients able to
inate HBsAg, when compared with the normal French
lation (5.05%, $p<10^{-4}$), and with patients unable
eliminate HBsAg (7.0%, $p<0.01$). Chronic aggres-
e hepatitis was only found in the latter. This
frequency of the HLA-A1,B8 association has also
found in patients with seronegative active
nic hepatitis and suggests that this phenotype
t be associated with high immune response against
g.

CONCENTRATIONS OF PLASMA GLYCOSPHINGOLIPIDS
IN ACUTE HEPATITIS. (Ger.) Atzpodien, W.;
ls, G.; Kremer, G. J.; Schnellbacher, E. (II.
Klinik und Poliklinik der Universitat, Langen-
strasse 1, D-6500 Mainz, W. Germany). *Klin.
enschr.* 55:457-459; 1977.

ma glycosphingolipid levels were determined in
atients with acute hepatitis in the acute and
acute phases of the disease and compared to
levels in 23 healthy controls. Blood samples
taken after 12 hr of fasting; monohexosyl,
xosyl, trihexosyl, and tetrahexosyl ceramide
determined by gas chromatography. In the acute
e of hepatitis, the glycosphingolipid fractions,
the exception of trihexosyl ceramide, showed
istically significant elevations in comparison
controls. Furthermore, cholesterin (acute:
± 96 mg/100 ml; postacute: 227 ± 43 mg/100 ml)
triglyceride (acute: 211 ± 65 mg/100 ml; post-
e: 129 ± 54 mg/100 ml) levels showed statis-
lly significant elevations ($p<0.01$) in compar-
with controls. The results suggest that the
eased plasma glycosphingolipid levels are a
bolic consequence of hyperlipoproteinemia and
they are in part synthesized *de novo* by the
r in a manner similar to very-low-density
proteins.

VASCULITIS IN HEPATITIS B INFECTION. (Ger.)
Muller-Schoop, J.; Gerber, N.; Knoblauch,
M. (Medizinische Klinik, Kantonspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):523-525; 1977.

The association of hepatitis B (HB) infection with various forms of vasculitis was investigated in 11 patients with polyarteritis nodosa and HB and 20 patients with recent giant cell arteritis (polymyalgia rheumatica and temporal arteritis). Hepatitis B surface antigen (HBsAg) and anti-HBsAg were measured by radioimmunoassay. Of the 11 patients with polyarteritis nodosa, 4 had a positive HBsAg test at every testing period, indicating a hepatitis B infection. Liver changes in these four patients did not correlate with the activity of periarteritis: one patient each had cirrhosis, chronic aggressive hepatitis, and chronic persistent hepatitis, whereas one patient who had no biopsy showed no biochemical liver changes. Anti-HBsAg was found in 7 of 20 patients with giant cell arteritis as compared with only 6% of the controls, but no concurrent liver disease was found in these patients. The results suggest that periarteritis in HBsAg-positive patients represents a rare but serious extrahepatic complication of hepatitis B infection. Evidently, circulating HBsAg/anti-HBsAg complexes play an important role in the development of HB-associated vasculitis.

5871 DETECTION OF HEPATITIS A ANTIBODIES AND ANTIGENS IN THE DIAGNOSIS OF HEPATITIS A INFECTION. (Ger.) Frosner, G. G. (Max-von-Pettenkofer-Institut fur Hygiene und Medizinische Mikrobiologie der Universitat, Pettenkoferstrasse 9 a, D-8000 Munchen 2, W. Germany). *Munch. Med. Wochenschr.* 119(24):825-828; 1977.

Hepatitis A antigen (HA-Ag) and antibodies were studied by radioimmunology and competitive solid phase radioimmunoassay for the diagnosis of HA infection. Centrifuged stool samples were incubated with ^{125}I-labeled HA-Ag for 16 hr for the determination of HA antigens; serum HA antibodies were measured by the extent of inhibition of the binding of ^{125}I-labeled HA-Ag. The fecal excretion of HA-Ag depended upon the severity of the disease. A patient with a slight subclinical infection excreted small amounts of HA-Ag for only 2 days, whereas HA-Ag excretion was already detected 11 days before the appearance of icterus in severe cases, reaching its maximum 6 or 7 days prior to the appearance of icterus; HA-Ag was detected in the stool of 50% of 101 patients with HA in the first week after the appearance of icterus, in 29% in the second week, and in only 4% in the third week. Low serum HA-Ag levels were demonstrated by radioimmunology with the appearance of icterus in 892 patients. The HA-Ag titer rose steeply in the first 2 weeks after the appearance of icterus attaining a maximum 3-5 months after start of the disease.

5872 HEPATITIS TYPE A AND HEMODIALYSIS: A SERO-EPIDEMIOLOGIC STUDY IN 15 U.S. CENTERS. (Eng.) Szmuness, W.; Dienstag, J. L.; Purcell, R. H.; Prince, A. M.; Stevens, C. E.; Levine, R. W.

(New York Blood Center, 310 E. 67 St., New York, NY 10021). *Ann. Intern. Med.* 87(1):8-12; 1977.

To assess the significance of dialysis in the spread of hepatitis A virus infections, 460 patients and staff from 15 U.S. dialysis centers were surveyed by the immune adherence hemagglutination technique for antibody to hepatitis A antigen (anti-HA). The age-standardized anti-HA prevalence was 42.9% in patients and 42.1% in staff. These rates are almost identical to those of socioeconomically comparable urban volunteer blood donors never exposed to dialysis settings. There was no correlation between anti-HA prevalences and duration of dialysis treatment or employment. Among 100 patients and staff followed for 1 yr, 92-94% did not change their anti-HA status. The prevalence of anti-HA was identical in subjects with past histories of multiple blood transfusions or accidental inoculations with blood-contaminated instruments and in those without such histories. It is concluded that hepatitis A virus rarely if ever spreads by parenteral mechanisms, that there is no epidemiologic evidence confirming the existence of chronic hepatitis A viremic carrier states, and that hemodialysis does not play a significant role in the spread of type A hepatitis.

5873 FECAL EXCRETION OF HEPATITIS A VIRUS IN HUMANS. (Eng.)

Rakela, J.; Mosley, J. W. (Univ. Southern California Sch. Medicine, Los Angeles, CA 90007). *J. Infect. Dis.* 135(6):933-938; 1977.

To define more completely the period of fecal excretion of virus during hepatitis A virus infection, 24 fecal samples from six children with clinical illness were studied during an epidemic of type A hepatitis. Immune electron microscopy revealed that all six patients had detectable virus excretion before or by the time of the first abnormality in serum glutamic-pyruvic transaminase (alanine aminotransferase). Viral excretion reached a peak early and declined to undetectable levels before levels of serum enzyme reached a peak. These data are in accord with epidemiologic evidence that individuals with symptoms and signs of type A hepatitis are unlikely to transmit the infection to others. Immune electron microscopy, may be a better index to the period of communicability than studies of experimental infection in human subjects. This conclusion suggests that precautions against fecal contamination are not usually necessary for hospitalized patients with type A hepatitis.

5874 TRANSMISSION OF NON-A, NON-B HEPATITIS. (Eng.)

Hoofnagle, J. H.; Gerety, R. J.; Tabor, E.; Feinstone, S. M.; Barker, L. F.; Purcell, R. H. (151-F, Veterans Admin. Hosp., 50 Irving St. N.W., Washington, DC 20422). *Ann. Intern. Med.* 87(1):14-20; 1977.

The stored serum samples from six asymptomatic blood donors who were implicated in the transmission of viral hepatitis were reanalyzed using serologic markers for hepatitis B virus and hepatitis A virus infection. The samples had been stored at -20 C for 25 yr. Two of the donor sera were hepatitis B surface antigen (HBsAg)-positive, and both transmitted hepatitis B virus infection to all 30 susceptible recipients (at the time of the original study, 25 yr ago), half of whom showed clinical symptoms. The remaining three infectious donors we HBsAg-negative, yet were icterogenic to 10% to 47% of recipients. Testing of serum samples from these recipients with hepatitis showed no evidence of hep titis B virus or hepatitis A virus infection. This study and other recent evidence suggest that there is a third type of human viral hepatitis—non-A, no hepatitis—that is due to a transmissible agent and may be associated with a chronic carrier state.

5875 PARENTERALLY TRANSMITTED NON-A, NON-B HEP TITIS: AN EPIDEMIC REASSESSED. (Eng.)

Meyers, J. D.; Dienstag, J. L.; Purcell, R. H.; Thomas, E. D.; Holmes, K. K. (U.S. Public Health Se vice Hosp., 1131 14th Ave. South, Seattle, WA 98114 *Ann. Intern. Med.* 87(1):57-59; 1977.

To further study the possible etiologic role of hep titis A and Epstein Barr virus in a nosocomial outbreak of parenterally transmitted hepatitis affect both marrow transplant patients and normal platele donors in an oncology unit, stored sera were reexamined for serologic evidence of hepatitis A or Epstein Barr virus infection. Because of the characteristics of the clinical illness, the incubatio period of 27 days, and the effect of immune serum globulin on the clinical illness, the outbreak was attributed to hepatitis A; there was no serologic evidence of either hepatitis B virus or cytomegalovirus infection. Ten patients and donors had undetectable antibody to hepatitis A (anti-HA) titer before illness and none seroconverted; five person had pre-existent anti-HA titers and showed no furt rise in convalescent sera. The serum of one patie was inevaluable. With the availability of serolog techniques for the diagnosis of both hepatitis A a hepatitis B virus infections, it is clear that mos cases of post-transfusion hepatitis are not due to either of these agents, and short incubation-perio hepatitis can not be assumed to be hepatitis A wit out further investigation.

5876 CLINICAL AND DIAGNOSTIC ASPECTS OF CYTOMEGALOVIRUS-INDUCED HEPATITIS. (Ger.)

Heni, N.; Heissmeyer, H.; Schmitz, H. (Medizinisch Universitatsklinik, Hugstetter Str. 55, 7800 Freiburg, W. Germany). *Dtsch. Med. Wochenschr.* 101 (44):1610-1612; 1976.

The diagnostic parameters for acute cytomegalovir induced infection are reviewed. The parameters i clude a cytomegalic IgM or IgA antibody titer ove 1:64, seroconversion or increase in the complemen binding reaction around the factor 4, and virus isolation from urine. Hepatitis and liver infect in connatal cytomegalovirus infection; symptoms o cytomegalic hepatitis in infants, children, and a ults; and differential diagnosis of the infection as compared to hepatitis B are also reviewed. Me n values of bilirubin maxima of 47.9 μM (28 mg/l), increase in γ-GT of up to 250 U/l, and a decrease seral iron level to an average of 11.6 μM (650 /l) have been established in cytomegalovirus patitis patients.

77 SIGNIFICANCE OF LIVER SIDEROSE EXAMINATION IN ACUTE VIRAL HEPATITIS. (Ser.) Janev, B. (Medical Faculty, Univ., Belgrade, Yugoslavia). *. Arh.* (9):603-613; 1976.

5878 ON DEVELOPMENT OF HYPOPLASTIC ANEMIA IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Shovkun, A. G.; Tupitsina, L. I.; Ostrovskaya, A. A.; Pidzhakova, S. S.; Proyavkina, A. M. (Dept. Infectious Childhood Diseases, Rostov-on-Don Medical Inst.; USSR). *Vopr. Okhr. Materin. Det.* 22(4):80-81; 1977.

See also, 5480, 5800, 5927.

LIVER AND BILIARY TRACT

Chronic Hepatitis

79 MODIFICATION OF PLASMA ALPHA-FETOPROTEIN LEVELS IN PATIENTS WITH PRIOR VIRAL HEPA-TIS. (Ita.) Gaidano, G. P.; Berta, L.; Boccuzzi, ; Angeli, A.; Frajria, R.; Bosio, G. (Istituto di dicina, Interna dell'Universita di Torino, Torino, aly). *Minerva Med.* 67(49):3193-3198; 1976.

asma alpha-fetoprotein (AFP) levels were determined two groups of patients with viral hepatitis. The rst group had had the disease 4-5 months previous-; the second group had had the disease 2-22 yr fore. No one in either group showed any indica-on of relapse or recurrence of the disease. ver function, as measured by SGOT, SGPT, and alka-ne phosphatase activities, was normal in all jects, and there was no indication of bilirub-emia. Hepatitis B antigen assays were negative all subjects. The median AFP value of all sub-cts was 3.75 ng/ml compared to a median of 1.29 /ml in normal subjects. Increased AFP levels be observed in acute viral hepatitis as a re-t of regeneration of necrotic tissue. The nes of liver cells that produce AFP may persist the liver after regeneration is complete, causing elevation of AFP observed in the recovered sub-cts.

30 IMMUNOLOGICAL STUDIES IN PROLONGED AND CHRONIC HEPATITIS. INTEREST IN DIAGNOSIS PROGNOSIS: 100 CASES. (Fre.) Ribet, A.; Nad-ny, M.: Oksman, F.; Frexinos, J. (Clinique des adies de l'Appareil Digestif, CHU de Rangueil, te de Narbonne, F-31054 Toulouse, France). *v. Presse Med.* 5(37):2440-2443; 1976.

immunological status of 100 patients with pro-ged hepatitis (PH), chronic active hepatitis H), and persistent chronic hepatitis (PCH) was luated during the third month of their disease. was generally paired with a normal immunologic dition, except for a frequent increase in gam-lobulins, IgG. The persistence of Australian igen at this stage strongly indicated a transition to a chronic, noncirrhotic hepatitis. ACH could usually be distinguished from PCH by the presence of high IgG levels. It could be found either with or without Australian antigen and/or autoantibodies. Cirrhosis was foreshadowed by a marked increase in IgA and IgM and by high levels of antinuclear and anti-smooth muscle antibodies.

5881 REACTION OF HUMAN SMOOTH MUSCLE AUTOANTIBODY WITH GASTRIC PARIETAL CELLS: A PITFALL IN THE DIAGNOSIS OF PARIETAL CELL AUTOANTIBODY. (Eng.) Ceredig, R.; Toh, B. H. (Monash Univ. Medical Sch., Commercial Rd., Prahran, Melbourne 3181, Australia). *J. Clin. Pathol.* 30(7):666-670; 1977.

Thirteen smooth muscle antibody (SMA) sera obtained from 13 patients with active chronic hepatitis were examined for immunofluorescence reactivity with gastric mucosal cells. Eight sera stained the cytoplasm of gastric parietal cells in a pattern indistinguishable from that obtained with parietal cell autoantibody (PCA). The staining reaction was localized to parietal cells by the demonstration that the same cells stained with both SMA and PCA in double immunofluorescence tests. The SMA staining intensity for parietal cells was weaker than that for smooth muscle. Specificity of the staining reaction for actin was established by the observation that parietal cell staining by SMA was inhibited by serum absorption with skeletal muscle F-actin but not by a microsomal fraction derived from gastric mucosa. Actin may play a role in the process of parietal cell acid secretion.

5882 MORPHOLOGIC ASSOCIATION OF LYMPHOCYTES WITH HEPATOCYTES IN CHRONIC LIVER DISEASE. (Eng.) Kawanishi, H. (Ann Arbor Veterans Admin. Hosp., 2215 Fuller Rd., Ann Arbor, MI 48105). *Arch. Pathol. Lab. Med.* 101(6):286-290; 1977.

The interrelationship between immunologically associated lymphocytes and hepatocytes was examined by light and electron microscopy, using epoxy-resin embedded thick and thin sections of biopsy liver tissues from seven patients with chronic persistent hepatitis (CPH) and nine with chronic active liver disease (CALD). Close apposition of lymphocytes with hepatocytes was classified according to morphologic features produced by surface contact, invagination, direct penetration, and aggregation. Lymphocytes in biopsy specimens from patients with CALD showed these morphologic patterns much more frequently than those from patients with CPH. Single-cell adherence occurred an average of five or more times per 10 blocks in subjects with CALD and only 0-2 times in subjects with CPH; the corresponding frequencies for clustering were 2-4 and 0-1, and for invagination were 1-2 and 0-1. These small, infiltrating lymphocytes established intimate contact with hepatocytes through their multiple-surface projections. Hepatocyte degeneration appeared to occur in association with the structural contact. The morphologic association of lymphocytes with hepatocytes in CALD is consistent with the participation of cell-mediated immune processes.

5883 CHRONIC HEPATITIS IN CHILDREN, DIAGNOSTIC AND THERAPEUTIC PROBLEM. (Rus.) Filipovic, D.; Vulovic, D. (Mother and Child Health Inst., Serbia, Beograd, USSR). *Srp. Arh. Celok. Lek.* 104(7/8):489-496; 1976.

5884 INCIDENCE AND SIGNIFICANCE OF POSITIVE WIDAL'S TEST IN CHRONIC ACTIVE HEPATITIS AND LIVER CIRRHOSIS. (Ita.) Ferlazzo, B. (Clinica delle Malattie Infettive dell'Universita, Ospedale Piemonte, 98100 Messina, Italy). *Boll. Ist. Sieroter. Milan.* 55(6):513-518; 1976.

5885 EXPERIENCE WITH IMMUNOSUPPRESSIVE TREATMENT FOR CHRONIC ACTIVE HEPATITIS. (Ger.) Gorski, M.; Jablonska-Kaszewska, I.; Bielawski, W. (I. Medizinischen Klinik, Medizinischen Akademie, ul. Debinki 7, PL-80-952 Gdansk, Poland). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):129-130; 1976.

5886 AUTOIMMUNE HEMOLYTIC ANEMIA WITH DONATH-LANDSTEINER ANTIBODIES AND ANTINUCLEAR FACTORS IN THE COURSE OF CHRONIC AGGRESSIVE HEPATITIS. Ziegler, G. B.; Heinkel, K.; Buchholz, H.; Habermann, W. (Blutspendedienst, DRK Nordrhein-Westfalen/Lippe, Feithstr. 180, D-5800 Hagen, W. Germany). *Z. Gastroenterol.* 14(5):548-555; 1976.

5887 CURRENT IMMUNOPATHOLOGICAL PROBLEMS OF CHRONIC HEPATITIS. (Ger.) Fodor, O. (III. Medizinischen Klinik, Universitat Cluj, Cluj, Rumania). *Dtsch. Z. Verdau. Stoffwechselkr.* 36 (3/4):127-128; 1976.

5888 SERUM IMMUNOGLOBULINS IN CHRONIC HEPATITIS. (Ger.) Tacorian, S.; Panaitescu, G.; State, I. N. (Institut fur Medizin und Pharmazie, Str. Progresului 8, Bucharest VII, Rumania). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):133; 1976.

5889 CLINICAL VALUE OF GAMMA-GLUTAMYL-TRANSPEPTIDASE IN CHRONIC HEPATITIS. (Spa.) Balcells, A.; Costa, J.; Cano, J. F.; Ballesta, A. (Hospital Clinico y Provincial, Barcelona, Spain). *Med. Clin. (Barcelona)* 66(9):429-431; 1976.

5890 STUDIES ON SERUM ENDOGENOUS VITAMIN B_{12} LEVELS IN CHILDREN WITH CHRONIC HEPATITIS. (Pol.) Kaczmarski, M.; Kossakowski, R.; Sokolewicz-Bobrowska, E.; Szpakowicz, T. (I Klinika Chorob Dzieci AM, ul. M. Curie-Sklodowskiej 26, 15-278, Bialystok, Poland). *Pediatr. Pol.* 51(12):1421-1427; 1976.

5891 STUDY OF THE HISTOLOGICAL AND BIOLOGICAL PARALLELISM OF THE ACTIVITY OF CHRONIC HEPATITIS. (Fre.) Lenoir, C.; Buffet, C.; Martin, E.; Toulet, J.; Etienne, J. P. (Hopital Antoine-Beclere, 92141 Clamart, France). *Gastroenterol. Clin. Biol.* 1(5):488; 1977.

5892 ARTERIAL HYPOXEMIA IN CHRONIC, DIFFUSE LIVER DISEASES. (Rus.) Mansurov, Kh. Kh
Pisanova, A. A. (Inst. Gastroenterology, Tadzhik SSR Acad. Sciences, Dushanbe, USSR). *Klin. Med. (Mosk.)* 54(10):78-81; 1976.

5893 PORTAL HYPERTENSION IN CHILDREN WITH CHRONIC HEPATITIS. (Rus.) Ebels, I. G.; Gauens, Ia. K.; Bergmanis, I. A. (Riga Medical Inst
State Children's Hosp., Riga, USSR). *Pediatriia* (7):30-32; 1976.

5894 PATHOLOGY OF MIXED FORMS OF CHRONIC AGGRESSIVE HEPATITIS AND PRIMARY BILIARY LIVER CIRRHOSIS [Abstract]. (Ger.) Kloppel, G.; Dammermann, H.; Lindner, H.; Berg, P. A. (No affil-
iation given). *Zentralbl. Allg. Pathol.* 121(3): 308; 1977.

See also, 5864, 5865.

Alcoholic Liver Disease

395 ALCOHOL CONSUMPTION AND DISEASES OF THE LIVER. (Eng.)

Thaler, H. (Wilhelmins-
tal, Montleartstrasse 37, A-1171 Vienna, Austria).
tr. *Metab.* 21(1/2/3):186-193; 1977.

e development of alcoholic liver diseases is re-
ewed. Alcoholic liver damage is only produced by
nstant alcohol intake. Close dose and time rela-
onships are apparent. For many years, alcoholic
tty liver is the only noticeable alteration. It
completely reversible in 2-4 weeks when ethanol
take is stopped. After about 6 yr of chronic
use, alcoholic hepatitis may develop. Once es-
blished, it progresses within weeks or months to
rrhosis if ethanol intake is not discontinued.
the other hand, alcoholic hepatitis heals under
mplete abstinence from alcohol with unimportant
brosis. After over-indulgence in alcohol over a
riod of 22 yr, there is a 50% probability of cir-
osis, demonstrating that the resistance of the
ver to alcohol varies considerably in different
dividuals. In early stages of alcoholic cirrhosis
e prognosis is good; if these patients observe
mplete abstinence from ethanol, their life expec-
ncy is only slightly different from the average
pulation. The extent of alcohol consumption is
cisive in the development of cirrhosis. New in-
stigations reveal that the susceptibility to al-
hol is different in both sexes. For men the danger
vel appears to be approximately 60 g and for
men around 20 g of 100% alcohol a day. Beyond
ese critical levels the morbidity of cirrhosis
ltiplies almost in geometric progression with in-
easing amounts of ethanol.

96 CLOMIPHENE CITRATE THERAPY IN A PATIENT WITH LAENNEC'S CIRRHOSIS. (Eng.)

Bjork,
T.; Varma, R. R.; Borkowf, H. I. (Milwaukee
nty General Hosp., 8700 W. Wisconsin Ave., Mil-
kee, WI 53226). *Gastroenterology* 72(6):1308-
1; 1977.

case of a patient with advanced Laennec's cir-
sis who was treated with clomiphene citrate is
sented. The patient, a 36-yr-old man, had ab-
ined from alcohol and had stable hepatic function
ts for 1 yr before starting therapy. Prior to
rapy, the cirrhosis was complicated by gyneco-
tia, testicular atrophy, impotence, and loss of
ido. Clomiphene citrate was started at a p.o.
e of 50 mg daily for 4 weeks, with increases in
dose of 50-mg increments at each 4-week interval
il the daily dose totalled 200 mg. At the low-
daily dose, luteinizing hormone and endogenous
tosterone levels were maximally elevated (87.5
/ml and >1.32 μg/dl, resp.). Follicle stim-
ting hormone was maximally elevated with the 100
dose (81.1 mIU/ml), and the elevation of total
rogen level was not affected by increasing the
e (it remained between 20.7 and 29.0 until 2
ths after therapy was discontinued). The total
tosterone level remained elevated 4 months after therapy was stopped, and luteinizing hormone remained elevated for 3 months. The androgen to estrogen ratio was unchanged with clomiphene citrate, but increased after completion of the therapy at 6 months. Prolactin levels were normal before and after therapy. During treatment, increase in testicular size was noted with resolution of impotence and improvement of libido that continued for 6 months after cessation of therapy. The gynecomastia remained unchanged despite the increased serum testosterone. An ejaculate for semen analysis, unobtainable before clomiphene citrate, was obtained after completion of therapy; it showed a normal volume and sperm count but poor motility with increase in abnormal and immature forms. There were no side-effects resulting from therapy. The patient relapsed, with regard to loss of libido and impotence, 8 months after therapy was discontinued. The data suggest that endocrine abnormalities in cirrhosis may improve at least transiently with clomiphene citrate therapy.

5897 EPIDEMIOLOGY OF FATTY DEGENERATION OF THE LIVER. (Ger.)

Buttner, W.; Bauch, K. (Bezirkskrankenhaus, Klinikum am Kuchwald, DDR-90 Karl-Marx-Stadt, Burgerstr. 2, E. Germany). *Dtsch. Gesundheitsw.* 32(19):887-890; 1977.

The occurrence of fatty degeneration of the liver in healthy subjects and patients of different age categories was determined with the aid of 3,760 liver biopsies and 338 liver specimens obtained at autopsy. The patients were classified into various categories including recently discovered untreated diabetics (263 biopsies), treated diabetics (432), apparently healthy persons (3,065), and those that died suddenly of unnatural causes (338 suicides and accidents). According to histological criteria established by Wildhirt, fatty degeneration of the liver was found in 38.8% of the recently discovered untreated diabetics, 19.6% of the treated diabetics, 9.6% of the apparently healthy subjects, and in 2.7% of the postmortem specimens. The occurrence of fatty degeneration of the liver was most frequently found between the ages of 55-65 yr, whereas it was lowest between 40-55 yr of age; alcohol was the chief cause of degeneration in male postmortem specimens, and fatty liver was also predominant in men up to 45 yr among the apparently healthy subjects. Fatty liver occurred more frequently in women past 45 yr of age, and overeating and obesity played a role in this condition in these latter individuals.

5898 ALCOHOL AND HYPERTENSION. (Eng.)

Beevers, D. G. (Western Infirmary, Glasgow G11 6NT, Scotland). *Lancet* 2(8029):114-115; 1977.

Because of the suggestion that there could be an association between alcohol intake, liver dysfunction, and raised blood pressure, liver function data were compared in 158 unselected hypertensives and 105 normotensives aged 45-64 yr. SGOT and SGPT concentrations were higher in male hypertensive patients than in normotensive men; 8.7% of the hypertensive men had elevated SGPT levels (>21 U/1) in comparison with 3.8% of the normotensive men ($p<0.01$), and the respective percentages for SGOT elevation were 4.1 and 2.0 ($p<0.02$). In female hypertensives, only SGOT distributions were significantly different from those in normotensive women (6.3% versus 2.0%, resp., $p<0.05$), although raised concentrations of SGOT and SGPT were more common in the hypertensive patients. SGPT tended to be higher in heavier drinkers (41.0 ± 10.1 U/1 in men, 32.3 U/1 in women) than in occasional drinkers (29.8 ± 2.3 U/1 in men, 22.8 ± 3.7 U/1 in women) or non-drinkers (27.4 ± 4.8 U/1 in men, 19.7 ± 2.0 U/1 in women); these differences were not statistically significant. The findings support the observation of an association between increased alcohol intake and high blood pressure and between liver damage and high blood pressure.

5899 DRINKING HISTORY AND OBJECTIVE CRITERIA FOR ALCOHOL-INDUCED LIVER DISEASE [Abstract]. (Eng.) Hamlyn, A. N.; Lesna, M.; Watson, A. J. (Royal Victoria Infirmary, Univ. Newcastle upon Tyne, England). *Gut* 18(5):A403; 1977.

5900 EFFECTIVE HYDROXYLATION OF VITAMIN D2 IN ADVANCED ALCOHOLIC CIRRHOTICS [Abstract]. (Eng.) Posner, D.; Russell, R.; Absood, S.; Merchant, C.; Connor, T.; Norris, A. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 72(5): 1113; 1977.

See also, 5398, 5553, 5798.

LIVER AND BILIARY TRACT

Cirrhosis

5901 PATHOLOGIC ASPECTS OF CIRRHOSIS: A REVIEW. (Eng.) Popper, H. (Mount Sinai Sch. Medicine, Fifth Ave. and 100th St., New York, NY 10029). *Am. J. Pathol.* 87(1):228-264; 1977.

Pathologic aspects of liver cirrhosis are reviewed. Although cirrhosis is characterized conventionally by a nodular parenchyma and widespread fibrosis with hepatocellular necrosis sometimes listed as a third component, cirrhosis is better described as the result of abnormal reconstruction of the preexisting lobular architecture. The following criteria indicate cirrhosis (with decreasing certainty): nodules surrounded by septa with or without portal and central canals (in fibrosis, a parenchymal portion near portal tracts may sometimes appear round), hepatic vein tributaries in contact with septa, connective tissue septa linking central with portal canals (particularly when bent or zigzag), fragmentation of specimens into round pieces surrounded in more than half of their circumference by thin layers of connective tissue, and irregularity of architecture including circumscribed variations in hepatocyte size and cell plate thickness, abnormal spacing of vascular channels, an excess of hepatic vein tributaries over portal tracts (especially if the latter are small) and, in adults, a paucity of centrolobular lipofuscin pigment in newly formed hepatocytes. Alteration of hepatic circulation is the key feature of cirrhosis and is also the main target of therapy in cirrhosis. Additional features that accompany, or are caused by, the altered hepatic circulation include: reduced functional mass of hepatic parenchyma, increased hepatic lymph flow, alteration of bile flow, and excess iron storage in periportal hepatocytes. Although cirrhosis is conventionally considered as an irreversible scar stage, collagen fiber turnove suggests a possible regression of septa. Thinnin and even disappearance of septa and relobulation nodules has been observed in experimental studies In man, regression of cirrhosis of the iron overload type has been described.

5902 DOES INTRA-ARTERIAL VASOPRESSIN CONTROL GASTROINTESTINAL BLEEDING IN CIRRHOTIC PATIENTS? (Eng.) Mackenzie, R. L.; Bury, K. D.; Provan, J. L.; St. Louis, E.; Marcon, N. (Wellesle Hosp., 160 Wellesley St. E., Toronto, Ontario, M4 IJ3, Canada). *Can. J. Surg.* 20(4):356-359; 1977.

The use of continuous intra-arterial infusion of vasopressin in the control of gastrointestinal bleeding was assessed in 24 cirrhotic patients wi

eeding. In all patients, the bleeding was local-
ed to esophageal varices or gastric erosions, or
th. Seventeen (71%) patients initially responded
vasopressin. Five patients stopped bleeding;
o of these survived and three died of liver fail-
e. In 12 patients the bleeding stopped or par-
al control of bleeding was achieved, but 11 of
em had further severe hemorrhage on one or more
casions; only 2 of the 12 survived. Seven pa-
ents did not respond to vasopressin; six of them
ed. The overall mortality was 79%. The data
ggest that the administration of intra-arterial
sopressin brings about temporary control of bleed-
g in some cirrhotic patients with gastrointestinal
morrhage but that current survival rates are poor.

03 DEMECLOCYCLINE: A NEW TREATMENT FOR WATER AND SODIUM RETENTION OF CIRRHOSES AND RE-
ACTORY ASCITES? (Fre.) Poupon, R.; Gustot, P.;
rnis, F. (Service d'Hepato-Gastroenterologie,
pital Saint-Antoine, 184, rue du Faubourg Saint-
toine, F 75571 Paris Cedex 12, France). *Nouv.
esse Med.* 5(31):1993-1994; 1976.

ve cirrhotic patients with refractory ascites and
ema were treated with demeclocycline (1,200 mg/
y) for at least 8 days. Urine output increased
om 300-900 ml/day to 1,800-2,700 ml/day. A di-
tion hyponatremia, which was present in three of
ve patients, was corrected, with sodium values
sing from 127-131 mEq/l to 135-149 mEq/l. Sodium
cretion rose from 0-10 mEq/day to 40-145 mEq/day.
e ascites and edema cleared up in three of five pa-
ents by the prolonged use of demeclocycline only,
thout any other treatment. These results confirm
e action of demeclocycline on abnormal antidiu-
tic hormone activity and reveal its natruretic
fect. It should be used only in patients with
rmal or elevated plasma volumes and with normal
al function.

04 PRE- AND POSTOPERATIVE EEG PROFILES IN PATIENTS WITH CIRRHOSIS OF THE LIVER
ER SHUNT OPERATION. (Ger.) Lanzinger-Rossnagel,
Christian, W.; Kommerell, B. (Medizinische Uni-
sitatsklinik, 6900 Heidelberg 1, Bergheimerstr.
W. Germany). *Dtsch. Med. Wochenschr.* 102(19):
-731; 1977.

readings were performed 1-3 months before and
to 5 yr after shunt operations in 27 patients
ed 16-69 yr) with liver cirrhosis and esophageal
ices, mostly of alcoholic etiology. Twenty pa-
nts had therapeutic shunts (direct portacaval
stomosis); indirect shunts were performed in
atients. Of the 27 patients, 14 already had
hological EEG changes (grade II-V) prior to
nt operation indicating hepatic encephalopathy.
toperatively, 16 of the 27 patients had patho-
ical EEG recordings. Generalized steep poten-
ls were seen frequently. Only four preoperatively
mal patients had cerebral dysfunction (enceph-
pathy) after the procedures. In two patients,
preoperative abnormal EEG worsened and persisted
to 4 wk postoperatively. The bioelectrical
disturbance manifested itself only 2-4 yr later in three patients. However, the basic disease (liver cirrhosis) can cause progressive encephalopathy. Of the 27 patients, 10 died within 2 months to 3.5 yr after the shunt operation; 5 patients had normal EEG findings preoperatively, whereas 5 had pathological grade II-V curves. The latter five died in hepatic coma, whereas three of the former five patients died of other diseases (prostatic carcinoma, cerebral hemorrhage, and acute dystrophic attack from liver cirrhosis). The cause of death was unknown in two patients. The results indicate that no improvement in the EEG occurs in patients with preoperative encephalopathy following shunt operation.

5905 EXPERIMENTAL RESEARCH ON ARTIFICIALLY INDUCED ANTIBODY IMMUNITY IN NORMAL SUBJECTS AND PATIENTS WITH CIRRHOSIS OF THE LIVER.

(Ita.) Zanacchi, G.; Bianchini, G.; Tentoni, M. (Istituti Ospitaliere di Cremona, II Divisione Medica, Cremona, Italy). *Minerva Med.* 68(9):587-598; 1977.

The immune response was measured in 20 patients with cirrhosis of the liver and in 5 normal controls given five injections of tetanus toxin at weekly intervals, and in 13 cirrhotic patients and 12 controls given a single injection of typhoid vaccine. Antibody (Ab) titer to tetanus toxoid was measured by passive hemagglutination; Ab titer to typhoid vaccine was measured by macroagglutination. Immunoglobulins G, A, and M (IgG, IgA, IgM) were measured by a radial immunodiffusion. There was no difference in Ab response to tetanus toxoid between cirrhotic patients and normal controls. IgM and IgA response after tetanus toxoid was higher in cirrhotic patients. Cirrhotic patients showed a minimal increase in IgG and IgA levels and a decrease in IgM levels following typhoid vaccine, while normal subjects showed a slight increase in IgG levels only. Antibody response to typhoid vaccine was significantly higher in cirrhotic patients, however. There was an increase in plasma cells and lymphocytes in the bone marrow of cirrhotic patients after typhoid vaccine administration. Increased IgG production in cirrhotics is seen as a generalized increased Ab response not related to immune pathogenesis. The liver may regulate immune response in some manner and this regulatory mechanism may be "turned off" during cirrhosis.

5906 IRON CONTAINING NUCLEAR INCLUSIONS IN HUMAN PIGMENTARY CIRRHOSIS.

(Ger.) Altmann, H. W. (Pathologisches Institut, Universitat Wurzburg, D-8700 Wurzburg, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 23(4):277-290; 1977.

Iron-containing nuclear inclusions were studied in biopsy specimens from a 69-yr-old man with pigmentary cirrhosis. Nuclear inclusions of cytoplasmic material containing degenerated and faintly stained hemosiderin granules were observed. Finely fibrillar or granular proteinaceous material, stainable by the Prussian blue reaction, were sometimes observed lying between the chromatin strands or occupying the whole nucleus and displacing the chromatin to the nuclear envelope ("margination of chromatin"). This material condensed into homogeneous masses and formed hexagonal yellowish-brown crystals with a diameter of up to 14 μ. The nuclear envelope and the marginated chromatin were eventually destroyed, and the crystals thus occurred free in the cytoplasm. The cytoplasm was eventually destroyed and ingested by the Kupffer cells. The intranuclear deposits of iron-containing protein were interpreted to be ferritin aggregates. It is proposed that ferritin molecules, built up in the cytoplasm, enter the nucleus via the pores of the nuclear envelope. Such an event signals a cytopathologic reaction and gives rise to cell shrinking and cell death.

5907 FAMILIAL HEMOCHROMATOSIS: PHYSIOLOGIC STUDIES IN THE PRECIRRHOTIC STAGE OF THE DISEASE. (Eng.) Feller, E. R.; Pont, A.; Wands, J. R.; Carter, E. A.; Foster, G.; Kourides, I. A.; *et al.* (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. J. Med.* 296(25):1422-1426; 1977.

Twelve members of a family with precirrhotic hemochromatosis were studied to define the physiologic abnormalities in the asymptomatic phase of the disease. Six of 12 had increased iron stores; the mode of inheritance was consistent with an autosomal dominant trait. Serum ferritin levels were no more predictive of tissue iron levels than measurements of serum iron, transferrin saturation, or chelatable iron excretion. In three affected family members, intestinal iron content was normal. Liver proline hydroxylase activity and urinary hydroxyproline excretion did not correlate with tissue iron content, suggesting that, in addition to the possible role of tissue iron, hepatic fibrosis may involve other factors. "Borderline diabetes mellitus" was present in three affected family members, but extensive studies revealed that pituitary dysfunction is uncommon in early hemochromatosis. Increased levels of liver iron proved to be the most reliable marker for the disease.

5908 PREGNANCY IN LIVER CIRRHOSIS AND/OR PORTAL HYPERTENSION. (Eng.) Cheng, Y. S. (Memorial Medical Center, P.O. Box 6688, Station C, Savannah, GA 31405). *Am. J. Obstet. Gynecol* 128(7):812-822; 1977.

Clinical features of pregnancy in women with liver cirrhosis and/or portal hypertension are reviewed. Termination of pregnancy is seldom indicated in a woman with compensated cirrhosis or a young woman with extrahepatic venous obstruction. However, the risk of spontaneous abortion is increased in cirrhotic women without shunt even if there is no deterioration of liver function. The risk of bleeding from esophageal varices or of deterioration of liver function is usually unpredictable. Shunt surgery can be done with relatively little effect on both the mother and the fetus if conservative measurements fail to control the hematemesis. Vaginal delivery can be anticipated in most women, and cesarean section should be reserved for obstetric indications. The risk of postpartum hemorrhage is greatly increased, particularly in patients with previous shunt surgery. Perinatal loss is high because of the increased rate of premature delivery and stillbirth. Maternal prognosis is grave in women with cirrhosis.

5909 SPONTANEOUS BLOOD SHUNTS IN CIRRHOSIS. (Rus.) Ivkov, V. G. (Municipal Clinical Hosp. #31, Moscow, USSR). *Klin. Med.* 55(4):20-24; 1977.

See also, 5396, 5397, 5800, 5815, 5816, 5858, 5884, 5892, 5893, 5894.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5910 BILE LEAKAGE FOLLOWING PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH THE CHIBA NEEDLE. (Eng.) Juler, G. L.; Conroy, R. M.; Fuelleman, R. W. (5901 E. 7th St., Long Beach, CA 90822). *Arch. Surg.* 112(8):954-958; 1977.

Experience with the Chiba needle in percutaneous transhepatic cholangiography (PTC) for jaundice of undetermined etiology in 30 patients is presented. Successful visualization of the biliary ductal system was accomplished in 26 patients; 2 of 6 patients with normal biliary systems had ducts visualized, and the ducts were visualized in the 24 patients (100%) with obstruction. Bile leakage of 50 to 500 ml (average, 200 ml) was observed at laparotomy or autopsy in 12 patients (40%), 9 (30%) of whom had symptoms of peritonitis. Six (20%) of these were transient and three (10%) progressed to an acute abdomen. Bacteremia occurred in seven patients (23.3%); in three (10%) it progressed to septic shock, with one death. There were no complications in patients with nonobstructed ducts. This study suggests that PTC with the Chiba needle has little advantage over the larger sheathed needles, and surgical standby is indicated in suspected cases of obstructive jaundice.

5911 INTRAVENOUS CHOLANGIO-CYSTOGRAPHY DURING CHILDHOOD. (Ger.) Fahr, K.; Opperman, H. C.; Willich, E. (Universitats-Kinderklinik, Im Neuenheimer Feld, 150, 6900 Heidelberg 1, W. Germany). *Fortschr. Roentgenstr.* 126(6):571-576; 1977.

Intravenous cholangiography was performed in 25 children (aged 2-15 yr) by injection (10 patients) or infusion (15) for epigastric complaints (7), icterus of unknown origin (3), epigastric tumor (3), round cell anemia (2), increased transaminase levels (2), occlusive icterus (1), suspicion of cholelithiasis (1), and liver calcification (1). Four control tests were also performed. The contrast media used (Biligram, 17% and 35% solutions) for infusion ranged from 0.8 to 1.6 ml/kg and for injection from 0.4 to 0.8 ml/kg, depending upon the age of the child. Overall, both methods provided good x-ray pictures of the biliary tree and gallbladder, and films were taken 30, 60, and 90 min after end of the injection and 40 min after a fatty meal. In only six cases could no images be seen. No pathological findings were noted in 8 of 15 patients given infusion. A segmental bile duct dilatation was diagnosed in two, colon fistula in one, and calculi in another child. Of the 10 patients given Biligram injection, segmental bile duct dilatation was diagnosed in a 3-yr-old child; no pathological findings were found in the other 9. Tolerance to both procedures was good. One patient with a known orthostasis syndrome developed collapse symptoms 3 hr after start of the trial, but this was not attributed to the contrast medium. No changes in SGOT, SGPT, LDH, or alkaline phosphatase levels were noted. Contrast medium was found in the gastrointestinal tract in 13 cases, which indicated that at least part of the i.v. injected agent had already passed into the intestines with the bile. Thus, this finding can also be used as a diagnostic indication of a hyperkinesis of the bile ducts and can exclude cholestasis.

5912 THE EFFECT OF CARBACHOL ON THE GALLBLADDER IN BLACK AND WHITE SUBJECTS. (Eng.) Drew, S. I.; Bayever, E.; Levy, J. I. (Dept. Surgery, Univ. California, Los Angeles, CA). *S. Afr. Med. J.* 51(21):739-740; 1977.

The effect of carbachol on gallbladder emptying was compared in 24 healthy Negro and 24 healthy Caucasian subjects. Cholecystography revealed no significant gallbladder contraction following the s.c. injection of carbachol (0.3, 0.6, 1.3, or 3.3 μg/kg) in the Caucasian subjects; no significant contraction was seen in one white patient after the injection of 3.6 μg/kg carbachol. Negro subjects showed a marked reduction in gallbladder size after the 1.3-μg dose ($p<0.05$), but not at any of the other three dose levels. No difference in gallbladder contractility was found between men and women, nor did gallbladder response appear to be related to oral contraceptive use. The greater contractility of the gallbladder in Negroes may account for the lower incidence of cholelithiasis in this population.

5913 THE SIGNIFICANCE OF CONJUGATED PHENOBUTIODIL (BILIODYL) IN THE INTESTINE IN THE ABSENCE OF GALLBLADDER OPACIFICATION: A PRELIMINARY ASSESSMENT. (Eng.) Calder, J. F. (Kenyatta Natl. Hosp., P.O. Box 30588, Nairobi, Kenya). *Clin. Radiol.* 28(3):299-300; 1977.

The significance of conjugated phenobutiodil in the intestine in the absence of gallbladder opacification was assessed in 41 patients. The gallbladders of these patients failed to opacify after two 3-g doses of the contrast medium. Thirty-four of these patients had conjugated phenobutiodil in the intestine, as evidenced by a 35 x 35 cm abdominal film. Thirty-three of these patients were shown by surgery or i.v. cholangiography to have gallbladder disease. The remaining patient appeared to have a normal gallbladder at operative cholangiography, and her symptoms were attributed to a duodenal ulcer. These findings indicate that the presence of conjugated contrast medium in the intestine in the absence of gallbladder filling strongly suggests the presence of gallbladder lesions.

5914 CONGENITAL DISEASES OF THE GALLBLADDER AND BILE DUCTS. (Eng.) Hatfield, P. M.; Scholz, F. J.; Wise, R. E. (605 Commonwealth Ave., Boston, MA 02215). *Semin. Roentgenol.* 11(4): 235-243; 1976.

The various types of cystic and noncystic diseases of the bile ducts are reviewed. Among the cystic diseases of the bile ducts, choledochal cyst (rare and difficult to diagnose), choledochocele (diverticulum of the common bile duct, diagnosis by cholangiography), solitary (nonparasitic) liver cyst (rare, diagnosed by a ^{99m}Tc-sulfur colloid liver scan, ultrasound, or computerized tomography and intravenous cholangiography), cystadenoma (1.5 to 25 cm in diameter), and polycystic disease of the liver are discussed. Among the noncystic diseases of the bile ducts, ductal ectasia in two forms (Caroli disease and congenital hepatic fibrosis with ductal ectasia, biliary atresia, and congenital strictures) are described. The majority of clinically significant congenital variations in the gallbladder (except choristoma) were reported in an earlier paper.

5915 THE DIAGNOSIS OF CYSTIC MALFORMATIONS OF THE BILIARY TREE DURING CHILDHOOD. (Ger.) Bliesener, J. A.; Wieners, H. (Kinderklinik/Rontgen-Abt., Amsterdamer Strasse 59, 5000 Koln 60, W. Germany). *Fortschr. Roentgenstr.* 126(6):577-580; 1977.

Cystic malformations of the biliary tree were diagnosed in a 22-month-old girl with obstructive jaundice by percutaneous transhepatic cholangiography

(PCH). The patient presented with icterus, right-sided epigastric pain, and a slightly enlarged liver. After 4 weeks, the patient's alkaline phosphatase (AP) level rose to 437 mU/ml, but no abnormalities were found by x-ray examination. Upon hospitalization, the AP, LDH, and total bilirubin levels were 3,810 mU/ml, 239 mU/ml, and 3.1 mg%, resp. A PCH was decided upon; well-defined dilation of the intra- and extrahepatic bile ducts was found, with septal-type stenoses at the confluens hepaticum. Operation revealed a high grade cystic dilation of the choledochus with bile grit and a stone; additional stenoses of the papillary region were also seen. A Roux-Y-Plastic procedure was performed, and the postoperative course was without complications. The AP level dropped, and total bilirubin decreased to 0.27 mg%. An x-ray follow-up revealed a decrease in the dilation of the bile ducts.

5916 PROSTAGLANDINS IN CHRONIC CHOLECYSTITIS.

(Eng.) Wood, J. R.; Stamford, I. F. (King's Coll. Hosp. Medical Sch., London SE5 8RX, England). *Prostaglandins* 13(1):97-106; 1977.

Prostaglandin (PG)-like material was extracted from the mucosa and muscle wall of 16 chronically inflamed human gallbladders. Basal PG levels obtained by homogenizing mucosa and muscle wall samples in acid-ethanol (AE) or in Krebs solution containing 10 μg/ml indomethacin (KIN) were similar, ranging from less than 1 up to 40 ng PGE_2 equivalents/g fresh tissue (AE) and from less than 1 up to 57 ng PGE_2 equivalents/g (KIN) in mucosa homogenates. These mean basal levels were 11.7 times higher than those in muscle wall homogenates ($p<0.0025$). More PG-like material was extracted from homogenates in Krebs solution without indomethacin, with the levels in the mucosa being 3.4-4.6 times basal levels (AE and KIN, resp.) and the levels in the muscle wall being 3.1 and 4.3 times basal levels (AE and KIN, resp.). The synthesized PG levels assayed in homogenates in Krebs solution without indomethacin were 12.7 times higher in the mucosa than in the muscle wall. Mucosal PG levels were higher in gallbladders with multiple gallstones (18-380 ng PGE_2 equivalents/g) than in gallbladders with a solitary stone (less than 1 up to 20 ng PGE_2 equivalents/g). Chromatography of mucosal extracts showed substances indistinguishable from primary PGE and PGF compounds together with a PGD_2-like component. When gallbladders were categorized according to pre-operative cholecystogram results, levels of mucosal PG-like material were not significantly different in the visualized and non-visualized groups. The above results show that both mucosa and muscle wall from chronically inflamed human gallbladders can synthesize PG-like material and that indomethacin inhibits this synthesis. PG levels did not correlate with the extent of the chronic inflammatory cell infiltrate.

5917 ALIATHIASIC CHOLECYSTOPATHIES: CLINICAL, DIAGNOSTIC AND THERAPEUTIC ASPECTS.

(Ita.) Spagliardi, E.; Guarda, P.; Levi, M.; Palombo, D.; Parini, U.; Sblendorio, L. (Divisione di Chirurgia Generale, Ospedale Regionale, Aosta, Italy). *Minerva Med.* 67(30):1935-1947; 1976.

The clinical, diagnostic, and therapeutic aspects of aliathiasic cholecystopathies are reported. The frequency of cholecystopathy is discussed, and the various disease forms are classified into diffuse and localized dyskinesias. The diffuse forms of the disease may be treated if the patient elects to do so. The localized disease should be treated by surgical intervention. Cholecytosis is also discussed, and diagnostic techniques and therapy for al forms of the disease are presented.

5918 THE RESULTS OF CHOLEDOCHODUODENAL ANASTOMOSES IN BILIARY LITHIASIS.

(Fre.) Maillet, P.; Chabal, J.; Boulez, J.; Barbier, B.; Sauma, A.; Baulieux, J. (Hopital de la Croix-Rousse, 69004 Lyon, France). *Ann. Chir.* 31(3):229-239; 1977.

A series of 148 patients were treated for biliary lithiasis with choledochoduodenal anastomoses (CDS) of which 105 were primary interventions and 43 secondary. The postoperative mortality was 4%. Long-term results were evaluated in 112 patients. Moderate to severe cholangitis recurred in only 5% of them, and it usually responded to medical treatment. Pathogenetically, the cholangitis was due to stasis, not to reflux. A reintervention was necessary in four cases; of these, there was one case of stenosis of the anastomosis, and three cases of recurrent lithiasis. The prognosis was generally poorer when intrahepatic lithiasis or acute inflammatory conditions were present. Results were good to excellent in 98.7% of primary CDS and in 82.3% of secondary CDS. These findings confirm the value of CDS; its replacement by other types of anastomoses does not seem justified.

5919 IN VITRO STUDIES OF GALLSTONE DISSOLUTION USING BILE SALT SOLUTIONS AND HEPARINIZED SALINE.

(Eng.) Hardie, I. R.; Green, M. K.; Burnett, W.; Wall, D. R.; Hall-Brown, A. (Dept. Surgery, Univ. Queensland, Brisbane, Queensland, Australia). *Br. J. Surg.* 64(8):572-576; 1977.

A controlled *in vitro* study of gallstone dissolution was carried out using a model designed to simulate the *in vivo* situation in the bile ducts. Sodium taurocholate (200 mM), sodium cholate (200 mM), heparinized saline (100,000 U/1), and physiological saline (0.9%) were infused for 10 days over 81 stones from 32 patients, and changes in weight and structure were recorded. The bile salt solutions caused weight loss in 81.5 and 85.7% of the stones treated, but the two saline solutions caused weight gains in 74.5 and 88%, resp. Fragmentation occurred in 18.5% of stones treated with sodium taurocholate, in 25% of those treated with sodium cholate, and in 11.8% of those treated with heparinized saline. Small stones lost a lower absolute amount of weight than large stones, but this represented a greater proportion of their initial weight. These investigations confirm the advantages of a dynamic *in vitro* model to study gallstone dissolution. Bile salt solutions infused into the bile ducts may clear retained stones by causing reduction in stone weight or fragmentation or both, but heparinized saline appears to be unsuitable for gallstone dissolution. Larger stones may require longer periods of infusion.

5920 THE EFFECT OF SOLVENT FLOW AND SOLVENT CONCENTRATION ON GALLSTONE DISSOLUTION IN VITRO. (Eng.) Motson, R. W.; Way, L. W.; Wong, A. (Veterans Admin. Hosp., San Francisco, CA 94121). *J. Surg. Res.* 22(3):287-293; 1977.

Solutions of bile acids alone, bile acids in combination with lecithin and heparin, and heparin alone were evaluated *in vitro* as cholesterol gallstone solvents in stagnant and flowing systems. Four stones, one from each of four patients, were exposed as a group to each test condition. Under flowing conditions, the solvent solution was continuously recycled at a rate of 20 ml/hr. Under both stagnant and flowing solution conditions, the rate of stone dissolution increased as the bile acid concentration was increased. Under flowing conditions, however, the rate of dissolution for each concentration of each bile acid solution was 5-30% greater than with the same solution without flow. After 2 weeks of exposure, 89% of the aggregate weight of the stones was dissolved by stagnant deoxycholic acid (150 mM) as compared with a 62% dissolution by stagnant (150 mM) cholic acid. In the same solutions with flow, deoxycholic acid dissolved 94% and cholic acid dissolved 92% of the stone weight. Thus, flow eliminated the difference between cholic and deoxycholic acid at the 150 mM concentration. Flow did little to increase dissolution by 100 mM cholate. The greatest effect of flow was seen at 150 and 200 mM concentrations of cholate. Flowing 150 mM cholic acid was equally as effective as the 200 mM concentration, with percentages of aggregate stone weight dissolution ranging from 66 to 98% at 150 mM and 76 to 99% at 200 mM cholic acid. Flow did not substantially change the dissolution rates by either 100 or 150 mM of deoxycholic acid. Heparin had no effect either alone or in combination with cholic acid, and lecithin did not enhance the rate of dissolution produced by cholic acid.

5921 EFFECT OF GALLSTONE-DISSOLUTION THERAPY ON HUMAN LIVER STRUCTURE. (Eng.) Bateson, M. C.; Hopwood, D.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee DD1 9SY, Scotland). *Am. J. Dig. Dis.* 22(4):293-299; 1977.

Liver biopsies were performed before and after 6-8 months of gallstone dissolution therapy with chenodeoxycholic acid (750 mg/day, p.o.) in six patients with gallstones. The only consistent change observed by light microscopy was an increase in the lipofuscin in five of six patients. Electron microscopy of hepatocytes showed consistent increases in lipid droplets and residual bodies after treatment. A slight increase in smooth endoplasmic reticulum, patchy loss of microvilli, and an accumulation of debris in the biliary epithelium were also observed. There was a significant increase in sinusoidal lipocytes or Ito cells after treatment, with the mean volume density (x 10^4) before treatment being 12.6 ± 2.16 and after treatment being 22.0 ± 3.16 ($p<0.001$). These six patients were representative of a group of 20 patients in whom serum liver function tests were followed monthly for at least 6 months. In these patients, the only significant change in blood tests was a modest rise in the aspartate aminotransferase level, which at 6 months after therapy (23.5 ± 8.2 IU) was statistically significant ($p<0.05$) in comparison with the pretreatment level (17.7 ± 3.7 IU). There was a trend towards a decline in both γ-glutamyl transpeptidase and elevated serum triglyceride levels, but the significance of these effects is not clear.

5922 CRITERIA FOR SELECTION OF PATIENTS FOR MEDICAL TREATMENT (CHENODEOXYCHOLIC ACID THERAPY) OF GALLSTONES. (Eng.) Bruusgaard, A.; Malver, E.; Pedersen, L. R.; Schlichting, P.; Sylvest, J. (Medical Dept. B, Frederiksberg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(1):97-102; 1977.

Criteria were investigated for the selection of gallstone patients suitable for chenodeoxycholic acid therapy, i.e., those with cholesterol stones. Gallstone composition studies on 24 consecutive patients admitted for surgery because of gallstones revealed that 17 patients had cholesterol-type gallstones (stones containing more than 50% cholesterol). In 16 of the 17 patients with cholesterol gallstones, the cholesterol saturation index of the bile was above 1.00, while this was also the case in 3/7 patients with non-cholesterol stones. Radiological examination disclosed radiolucent stones in all 17 patients with cholesterol stones and in 3/7 patients with non-cholesterol stones. In 2/3 patients with non-cholesterol stones of the radiolucent type, the cholesterol saturation index of the bile was below 1.00, and in the third patient the index was only slightly elevated (1.16). Thus, by combining the results of radiography and the cholesterol saturation index of the bile, only one patient was incorrectly classified as belonging to the cholesterol stone group, and incorrect exclusion of patients from the cholesterol stone group occurred in only one instance. Although the determination of the lipid composition in bile can only be performed in duodenal aspirate when patients are being selected for medical treatment of gallstones, a comparison of the cholesterol saturation indices in gallbladder bile and duodenal bile in seven patients indicated that in no instance were the indices divergent with respect to the demonstration of normal or abnormal bile (index below or above 1.00). It is concluded that radiolucency of the stones and a cholesterol saturation index in duodenal bile of above 1.00 are fairly reliable criteria for the selection of patients for dissolution therapy with chenodeoxycholic acid.

5923 BREAKING UP RESIDUAL GALLSTONES WITH AN ULTRASONIC DRILL. (Eng.) Davies, H.; Bean, W.; Barnes, F. S. (Univ. Colorado Medical

Center, 4200 E. 9th Ave., Denver, CO 80220). *Lancet* 2(8032):298-299; 1977.

The use of an ultrasonic drill to break up residual gallstones is reported. The patient, a 69-yr-old man, initially underwent cholecystectomy, at which time a size 14 T-tube was left *in situ*. Cholangiography performed through the T-tube 1 month after the operation showed a large stone in the hepatic duct. The stone was mobile and did not obstruct biliary flow. At 3.5 months after the initial operation, a catheter containing a 5-cm basket was passed into the biliary tree under fluoroscopic control. Once the basket extruded beyond the tip of the catheter, the stone was readily trapped in it, and the flexible shaft of the ultrasonic drill was introduced through the lumen of the basket-shaft. The stone broke up, and one 8-mm fragment remained in the duct; this was readily removed with the basket 2 days later. Repeat T-tube cholangiography showed a normal postoperative biliary tree, and the patient is well.

5924 GALLSTONE ILEUS REVEALED BY ENDOSCOPY. (Eng.) Tauris, P. (Silkeborg Centralsygehus, DK-8600 Solkeborg, Denmark). *Endoscopy* 9(2):104-106; 1977.

The case of an 85-yr-old woman with gallstone ileus is presented. The patient presented with epigastric pain, vomiting, and dehydration. Radiological examination revealed gas-fluid levels in the ascending colon but no signs of calculi. Two stones were visualized in the duodenum during panendoscopy. At laparotomy, the stones were manipulated from the duodenum to the stomach, where they were removed through a small gastrotomy. This is the first known case of gallstone ileus that has been diagnosed by direct visualization during endoscopy.

5925 A CRITICAL ANALYSIS OF THE VALUE OF LAPAROSCOPY IN 100 CASES OF CHOLESTATIC ICTERUS. (Fre.) Chousterman, M.; Chaput, J. C.; Buffet, C.; Gueroult, N.; Etienne, J. P. (Hopital A.-Beclere, 157 rue de la Porte-de-Trivaux, 92141 Clamart, France). *Gastroenterol. Clin. Biol.* 1(4): 319-330; 1977.

The diagnostic value of laparoscopy was evaluated in a retrospective study of 100 patients with cholestatic icterus of confirmed etiology. Intrahepatic cholestasis was generally associated with a normal gallbladder (26/28 patients) and a liver that appeared irregular (8/45), nodular (7/43), or tumoral (42/45). Extrahepatic cholestasis was implied when the liver was a uniform or mottled green (48/53) and the gallbladder was distended (31/34) or inflamed and/or lithic (10/12). The level of cholestasis was correctly determined in 81% of patients, misdiagnosed in 6%, and undetermined in 13%. Laparoscopy was especially useful in diagnosing cancer of the liver or pancreas, cholestatic hepatitis, lithic icterus, and alcoholic hepatopathies, which together accounted for 77% of all cases. It is a valuable diagnostic tool and should be performed first before a retrograde cholangiographic endoscopy or other procedure are attempted.

5926 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY (ERCP) IN OBSTRUCTIVE JAUNDICE CAUSED BY METASTATIC TESTICULAR TERATOMA. (Eng.) Rentsch, I.; Gartner, U.; Muller, P.; Kerk, L. (Krankenhaus Sebaldsbruck, Saarburger Strasse 56, 2800 Bremen 44, W. Germany). *Endoscopy* 9(2):101-103; 1977.

The case of a 28-yr-old man with obstructive jaundice caused by a metastatic testicular teratoma is presented. The patient presented with back ache, upper abdominal pain, anorexia, weight loss, and a palpable abdominal tumor. He then developed rapidly progressing icterus and elevated liver enzyme levels. The results of an upper gastrointestinal series and i.v. urography suggested the presence of a retroperitoneal tumor with displacement of the upper abdominal organs. Endoscopic retrograde cholangiopancreatography (ERCP) reveale that Wirsung's duct was displaced ventrad in a convex manner. The main pancreatic duct was slight narrowed in the prepapillary area with diminution of the small ducts. The common bile duct was stenosed, but the intrahepatic ducts and gallbladder were normal. The postmortem examination revealed the testicular teratoma and masses of confluent metastatic lymph nodes in the inguinal, paravertebral, para-aortic, mesenteric, and portal regions of the lymphatic system.

5927 EFFECT OF GLUCAGON INFUSION OF PLASMA CYCLIC AMP IN PATIENTS WITH CHOLESTATIC HEPATITIS AND OBSTRUCTIVE JAUNDICE. NEW TEST OF HEPATIC CHOLESTASIS. (Eng.) Francavilla, A.; Pansini, F.; Sansone, F.; Albano, O.; Martellotta, G. (Div. Gastroenterology, Univ. Bari, Bari, Italy *Clin. Chim. Acta* 75(3):351-357; 1977.

Plasma cyclic AMP levels during glucagon infusion (200 ng/kg/min, i.v., over 60 min) were determined in 10 patients with cholestatic hepatitis (hepatit A and B), 9 patients with extrahepatic obstructive jaundice, and 8 normal subjects. Plasma cyclic AM levels during glucagon infusion were greater in patients with jaundice or hepatitis than in normal subjects. In controls, cyclic AMP concentration rose promptly from a basal value of 15 ± 2 to a maximal value of 610 ± 73 pmol/ml at the 30th min of infusion, followed by a slight decrease to values of 441 ± 72 and 327 ± 65 pmol/ml at 50 and 60 min of infusion, resp. In patients with cholestatic hepatitis, cyclic AMP rose from a basa value of 32 ± 2 to a maximal value of 840 ± 125 pmol/ml at the 40th min and then decreased slightl to 725 ± 120 pmol/ml at the 60th min of infusion. Statistically significant differences from control were observed only at the 60th min ($p<0.02$). Cycl AMP levels in patients with obstructive jaundice rose rapidly from a basal value of 40 ± 2 pmol/ml to a maximal plateau value of 800 ± 70 pmol/ml at the 20th min of infusion. Almost all values observed over the 60-min infusion period for patients with obstructive jaundice differed significantly from those of controls. A statistically significant difference ($p<0.001$) in plasma cyclic AMP concentrations was found between patients with cholestatic hepatitis (164 ± 25 pmol/ml) and patients with obstructive jaundice (473 ± 50 pmol/ml) at the 10th min of glucagon infusion. These results indicate that plasma cyclic AMP levels at the 10th min of glucagon infusion represent a reliable diagnostic index of cholestatic jaundice. It is estimated that wherever cyclic AMP plasma concentration is 10 times higher than the basal value at the 10th min of glucagon infusion, obstructive jaundice is present.

5928 CHANGES IN ORGAN-SPECIFIC ENZYME ACTIVITY AND ULTRASTRUCTURE OF LIVER CELLS IN CHOLELITHIASIS. (Rus.) Blyuger, A. F.; Maiorg, A. Ya.; Mutsenieks, P. P.; Bolotova, M. A.; Kartashova, O. Ya.; Zaltsmane, V. K. (Riga Medical Inst., USSR). *Vopr. Med. Khim.* 23(4):435-440; 1977.

5929 BALLISTO-CARDIOGRAPHY IN HEPATOBILIARY SYSTEM LESIONS IN CHILDREN. (Ukr.) Zelenetsky, V. S. (Kiev Medical Inst., USSR). *Pediatr. Akush. Ginekol.* (3):6-7; 1977.

See also, 5265, 5514, 5515, 5517, 5520, 5524, 5525, 5535, 5542, 5546, 5551, 5554, 5632, 5774, 5793, 5800, 5804, 5825, 5837, 5845, 5950, 5955, 5956, 5963.

GENERAL

5930 ANAL PRESSURE STUDIES IN SPINAL PATIENTS. (Eng.) Wheatley, I. C.; Hardy, K. J.; Dent, J. (Repatriation General and Austin Hosp., Melbourne, Australia). *Gut* 18(6):488-490; 1977.

Maximal anal sphincter pressure was measured in 18 patients with spinal cord lesions and in a group of 10 controls, using a new technique, perfused sleeve manometry. With this system, the region of maximal pressure can move along the length of the sleeve without any significant change in the pressure registered. The mean resting pressure of the spinal patients was 63 ± 8 mm Hg, and of the control group 116 ± 14 mm Hg ($p<0.01$). When the rectum was distended by a balloon inflated with 100 ml of air, anal sphincter pressure fell to 33 ± 6 mm Hg in the spinal group and to 78 ± 10 mm Hg in the control group.

5931 BILE SALT METABOLISM IN CHRONIC UNSPECIFIC ENTEROPATHIES WITH BACTERIAL INVASION. (Ger.) Fodor, O.; Dumitrascu, D.; Grigorescu, M.; Serban, D.; Suciu, A. (Clinica III medicala, str. lasilor nr. 16, Cluj-Napoca, Rumania). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(1):17-21; 1976.

The intraluminal metabolism of bile salts was studied in 30 patients with nonspecific enteropathies with bacterial invasion (13 patients with Reichel-Polya stomach resection, 11 with normochlorhydria, 6 with achlorhydria). The contents of the small intestine (obtained by stomach tube in the morning and 12 hr after the last meal) were studied in aero- and anaerobiotic media; bile salts were determined enzymatically with 3-alpha-hydroxysteroid dehydrogenase. The following bacteria were found in the jejunal juice: *Mima polymorpha* (10 cases), *Escherichia coli* (6), *Bacterium anitratum* (2), *Staphylococcus albus* (8), *S. aureus* (2), *Streptococcus fecalis* (7), and hemolytic streptococci (8). The concentration of conjugated bile acids (glyco- and tauro-conjugated) in the jejunum was significantly lower in patients with chronic enteropathies or invasion by bacteria that metabolize bile salts, while free bile acids remained constant. Conjugated bile acid levels returned to normal following oral treatment with wide spectrum antibiotics (mean 8.24 ± 1.32 μmol/ml), whereas free bile acids disappeared or dropped markedly in the contents of the small intestines. The relation between the bile acid fractions returned to normal at the same time; these changes paralleled a marked decrease in the number of bacteria or a sterilization of the intestinal contents. Intraluminal metabolism of bile salts, as known in blind-loop syndrome, also occurs in chronic nonspecific enteropathies with bacterial invasion.

5932 PHENFORMIN AND HYPERAMYLASEMIA IN LACTIC ACIDOSIS. (Eng.) Conlay, L. A.; Loewenstein, J. E. (Louisiana State Univ., Sch. Medicine, Shreveport, LA 71130). *Ann. Intern. Med.* 87(3):312-313; 1977.

Twenty-six cases of lactic acidosis (metabolic acidosis with arterial lactate >5.0 mM or an unexplained anion gap >20 mEq/1) occurring during a 23-month period in a metropolitan hospital were reviewed to ascertain the frequency of hyperamylasemia. Serum amylase activity had been measured in 12 of 26 patients and was elevated (>200 IU) in eight (67%). Hyperamylasemia was not significantly more frequent in patients with phenformin-associated lactic acidosis than in patients with lactic acidosis who had not received phenformin, suggesting that this drug is not responsible for increased amylase activity. Serum amylase activity did not correlate with the severity of acidosis (arterial pH) or with renal function (serum creatinine). Other possibilities such as macroamylasemia, laboratory artifact, or release of amylase from tissues other than the pancreas have yet to be investigated.

5933 INFLUENCE OF CARBON CHAIN LENGTH OF DIETARY FAT ON INTESTINAL ALKALINE PHOSPHATASE IN CHYLOUS ASCITES. (Eng.) Malagelada, J. R.; Stolbach, L. L.; Linscheer, W. G. (Tufts Univ. Sch. Medicine, Boston, MA). *Am. J. Dig. Dis.* 22(7):629-632; 1977.

To clarify the relation between lymphatic transport of intestinal alkaline phosphatase (IAP) and fat ingestion, two patients in whom leakage from the intestinal lymphatic system into the peritoneal cavity produced chylous ascites were studied. Both patients had lymphatic leakage that was due to obstruction. During baseline studies both patients were maintained on a standard diet containing 100 g long-chain triglycerides (LCT). A medium-chain triglyceride (MCT) diet containing 110 g MCT was substituted for the LCT diet for 13 and 8 days in each patient, resp. After the MCT diet, both patients resumed the previous LCT diet for at least another 2 weeks. Substitution of MCT for LCT produced a marked decrease of the triglyceride concentrations in chylous ascites, which subsequently became cleared. The decrease in triglyceride concentrations was associated with a decrease in total alkaline phosphatase activity in chylous ascites. The decrease was due to a selective fall in the IAP fraction. With the resumption of the LCT diet, IAP, total alkaline phosphatase activity, and triglyceride levels returned to baseline levels. IAP activity and triglyceride concentration in chylous ascites were linearly related in both patients, suggesting a positive relation between absorption of LCT and transport of mucosal alkaline phosphatase into lymph.

5934 EVALUATION OF A SUCROSE/ELECTROLYTE SOLUTION FOR ORAL REHYDRATION IN ACUTE INFANTILE DIARRHEA. (Eng.) Chatterjee, A.; Jalan, K. N.; Agarwal, S. K.; Mahalanabis, D.; Maitra, T. K.; Bagchi, D. K.; Indra, S. (Calcutta Medical Res. Inst., 7/2 Diamond Harbour Rd., Calcutta 27, India). *Lancet* 1(8026):1333-1335; 1977.

The efficacy of a sucrose-based p.o. electrolyte solution in the treatment of children (median age 1 yr) with severe to moderate dehydration caused by acute diarrhea was studied in 20 patients, and the effect of a temporary depression of sucrase in the small bowel mucosa during acute diarrhea was examined in 16 cases. A p.o. sucrose/electrolyte solution (in mM; 50, Na; 15, K; 50, Cl; 15, HCO_3; and sucrose, 130; 15 ml/kg/hr) brought about complete hydration in 19/20 children. The amount of fluid needed for initial hydration was 214.1 ± 13.8 ml/kg, and the time required to achieve this was 14.2 ± 0.94 hr. One child did not respond and required i.v. therapy. Vomiting, abdominal distention, and the appearance of sugar in the stools during p.o. hydration did not interfere with the success of the treatment. A satisfactory response was shown by weight gain (9.2 ± 0.6%), restoration of plasma bicarbonate to normal levels, decreases in the hematocrit values and in the plasma specific gravity, and complete clinical recovery. Disaccharidases in jejunal mucosal biopsy specimens in the acute phase showed reduced lactase in 75% and reduced sucrase in 18%; maltase levels were adequate. Except for the child who did not respond, all patients showed a satisfactory rise in blood sugar after sucrose and glucose tolerance tests. Since sucrose is cheaper and more easily obtained than glucose, its use in electrolyte solutions is indicated.

5935 CLINICAL FEATURES OF ACUTE GASTROENTERITIS ASSOCIATED WITH HUMAN REOVIRUS-LIKE AGENT IN INFANTS AND YOUNG CHILDREN. (Eng.) Rodriguez, W. J.; Kim, H. W.; Arrobio, J. O.; Brandt, C. D.; Chanock, R. M.; Kapikian, A. Z.; *et al.* (Children's Hosp. Natl. Medical Center, 111 Michigan Ave., N.W., Washington, DC 20010). *J. Pediatr.* 91(2): 188-193; 1977.

The clinical features of 72 infants and children with a human reovirus-like agent (HRVLA) are described. The cases were detected between January 1974 and June 1975 in 152 infants and children hospitalized with acute gastroenteritis. Seventy-six percent of infants and children 7-12 months of age and 76% of those 13-24 months of age had infection with the HRVLA, whereas such infection was found in only 21% of infants under 6 months of age and 23% of children 25-60 months of age. Sixty-one percent of patients studied during the cooler months had HRVLA infection, and such infection was no found from June to October. Twice as many HRVLA-infected patients had vomiting (92%) and significant dehydration (83%). It appears that certain epidemiological and clinical findings are helpful in distinguishing gastroenteritis due to HRVLA from other causes in hospitalized children: age, time of year, and frequency of vomiting and dehydration.

5936 PROTRACTED DIARRHOEA IN INFANCY: ANALYSIS OF 82 CASES WITH PARTICULAR REFERENCE TO DIAGNOSIS AND MANAGEMENT. (Eng.) Larcher, V. F.; Shepherd, R.; Francis, D. E. M.; Harries, J. T. (King's Coll. Hosp., Denmark Hill, SE5 8RX, England). *Arch. Dis. Child.* 52(8):597-605; 1977.

The diagnosis and management in 82 cases of protracted diarrhea in infancy presenting over a 6-yr period were analyzed. The patients fell into one of two categories according to whether a specific diagnosis was established. A diagnosis (category 1) was established in 59, the commonest diagnoses being celiac disease (33.2%), secondary disaccharide intolerance (12.2%), and cows' milk protein intolerance (11.3%). Other diagnoses included primary sucrase-isomaltase deficiency, Shwachman's syndrome, ulcerative colitis, ganglioneuroma, defective opsonization, staphylococcal pneumonia, and Hirschsprung's disease. Despite intensive investigation, a diagnosis could not be established in 23 infants (category 2). Age of onset of symptoms in this group tended to be earlier than in category 1 patients, and six presented with diarrhea dating from birth. There was a high incidence of associated extraintestinal anomalies in these six patients, and in siblings who had died after protracted diarrhea dating from birth. Four of the six infants died, accounting for a mortality of 5% for the whole series. The remaining 17 patients in category 2 presented at a mean age of 4.9 weeks with a range of 1-18 weeks. All these 17 patients made an excellent response after institution of a chicken-based dietary formula. The pathophysiological mechanisms that may be operating in infants with protracted diarrhea are discussed. The authors speculate that, in a proportion of affected patients, an acute infective insult renders the small intestine susceptible to intolerance of foreign proteins and/or bacterial colonization, and that this sequence of events may be important in the pathogenesis of the diarrhea and malnutrition.

5937 A CRITIQUE OF ORAL THERAPY OF DEHYDRATION DUE TO DIARRHEAL SYNDROMES. (Eng.)

Nichols, B. L.; Soriano, H. A. (Baylor Coll. Medicine, Houston, TX 77030). *Am. J. Clin. Nutr.* 30(9):1457-1472; 1977.

Approaches to the management of diarrheal syndrome that have the potential for wide application in developing countries are reviewed. Under the circumstances of limited health resources and immediate need for preventing the dehydration associated with diarrhea in infants, breast-feeding should be encouraged throughout the diarrheal episode. When this is not possible because of cessation or failure of lactation, a p.o. electrolyte solution should be administered. It should be sterile and provide a quantity of electrolytes not greatly in excess of 30 mEq/l of sodium and potassium. There should be little possibility of an error in the dilution of the mixture if it is to be supplied in powdered form. Milk should be reintroduced after 24 hr and the electrolyte mix rapidly discontinued so as to minimize nutritional deficits. If no such electrolyte mixture is available, it is reasonable to alternate feedings of commercial soft drinks or bland teas with milk feedings. There should be specific instructions that the infant should be brought to the hydration center if more than three sequential feedings are lost by vomiting, if fever is present, or if the stools exceed the volume of three feedings. In general, dehydration of less than 5% of body weight can be managed by this program in the home. Dehydration greater than 5% but less than 10% requires supervision by health authorities. Dehydration greater than 10% requires i.v. therapy in a hydration center. In those countries with cholera and during epidemics of shigellosis or enterotoxigenic *Escherichia coli*, solutions containing 90 mEq/l of sodium should be given under ambulatory supervision. This solution should be discontinued when fecal losses moderate (<60 ml/kg/day) and the lower electrolyte solution (30 mEq/l) substituted.

5938 MORPHOLOGICAL AND FUNCTIONAL CHANGES OF THE SMALL INTESTINAL MUCOSA IN PATIENTS WITH KIDNEY DISEASES OF VARIOUS DEGREES OF INSUFFICIENCY, AND IN PATIENTS RECEIVING HEMODIALYSIS. PART 1: MORPHOLOGICAL CHANGES OF THE SMALL INTESTINAL MUCOSA. (Ger.)

Sperschneider, H.; Stein, G.; Kuhne-Heid, R.; Kunath, H. (Medizinische Klinik des Bereiches Medizin, Friedrich-Schiller-Universitat, Bachstr. 18, DDR-69 Jena, E. Germany). *Dtsch. Gesundheitsw.* 31(51):2408-2412; 1976.

Morphological changes of the small intestinal mucosa were studied in 115 hospitalized patients with chronic pyelonephritis (61 patients) and glomerulonephritis (54) of various degrees of renal insufficiency. Twenty-six of the patients had chronic intermittent hemodialysis for less than 6 months up to 4 yr. Microscopic and histologic examination of small intestinal biopsy material from 77 patients showed a significant increase in pathological findings, with deterioration of renal function as evidenced by villous fusion and atrophy as well as marked inflammatory changes of the mucous membrane. Pathological readings in lactose tolerance, iron absorption, and fat absorption tests were associated with progressive renal insufficiency. Disturbances in lactose absorption were also seen in intact small intestinal mucosa. The disturbances in fat and lactose absorption were significantly reduced by long-term hemodialysis treatment, whereas no change in decreased iron absorption was noted. Thus, the histological changes (enteritis, villous fusion, and atrophy) are reversible (partly due to hemodialysis), but the authors also note the importance of diet in epithelial regeneration, since malnutrition is imminent in progressive renal insufficiency until dialysis is instituted.

5939 THE SIGNIFICANCE OF STARCH POWDER CONTAMINATION IN THE AETIOLOGY OF PERITONEAL ADHESIONS. (Eng.)

Cooke, S. A. R.; Hamilton, D. G. (Dept. Surgery, Univ. Witwatersrand, Johannesburg, South Africa). *Br. J. Surg.* 64(6):410-412; 1977.

The frequency, clinical features, and natural history of peritoneal starch granuloma and adhesion formation from starch glove powder were studied in 20 patients who each underwent two laparotomies within a 1-month to 9-yr period. Starch granulomas or adhesions containing starch were found at the second laparotomy in 10 patients. Among the 20 patients, starch granulomas were present within adhesions at the second operation in 6 of the 15 patients with adhesions and within adhesions in 2 of the 4 patients presenting with intestinal band obstruction. In the 10 patients with starch granulomas within peritoneal nodules or adhesions, the time interval between the first and second operation was less than 24 months, and in 7 of the 10 patients, this interval was less than 12 months. Those adhesions containing starch granulomas and occurring in patients whose initial laparotomy had occurred more than 3 months previously appeared to have a mature structure. In those patients showing no evidence of starch granulomas, only two underwent the second laparotomy within 24 months of the first. The original pathology or the procedure performed at the first laparotomy included colon perforation or colon resection (5 patients with starch granuloma, 4 without), small bowel perforation (3 with, 1 without), laparotomy and colostomy (3 with, 1 without), perforated peptic ulcer (0 with, 2 without), and total esophagectomy (1 with, 0 without). The evidence suggests that granuloma formation is common in the early months following operation and that adhesions associated with starch granulomas cause intestinal obstruction. Although starch is usually absorbed within 2 yr, associated band adhesions may persist. Glove powder contamination of the peritoneal cavity may be a common cause of band adhesion obstruction.

5940 THE REMOVAL OF GASTRIN-SECRETING TISSUE IN THE TREATMENT OF ZOLLINGER-ELLISON SYNDROME. (Fre.) Joyeux, R.; Colin, R.; Nicot, H.; Combettes, P. S. (Clinique Chirurgicale A, Montpellier, Cliniques Saint Eloi, 2, rue Bertin-Sans, 34059 Montpellier Cedex, France). *J. Chir. (Paris)* 113(5/6):457-470; 1977.

A review of the literature revealed 24 cases of Zollinger-Ellison syndrome that were treated by the removal of the gastrin-secreting tumor rather than by a total gastrectomy. The removal of the entire gastrinoma is easily verified by the preoperative measurement of serum gastrin levels, which should drop within 30 min of the removal of gastrin secreting tissues. Of the 24 patients, 12 had malignant tumors, and 11 of them showed no further neoplastic evolution after 4 months to 9 years. Peptic ulcers healed spontaneously in 13/14 patients. In contrast, of 78 other patients with Zollinger-Ellison syndrome treated by total gastrectomy, only 16 survived more than 3 yr. A total gastrectomy must still be considered if the gastrinoma cannot be found or removed or if there is a recurrence of the ulcers or neoplasm.

5941 DIAGNOSTIC SIGNIFICANCE OF THE SECRETIN PROVOCATION TEST IN ZOLLINGER-ELLISON SYNDROME. ANALYSIS OF 21 CONSECUTIVE POSITIVE SECRETIN TESTS. (Fre.) Mignon, M.; Accary, J. P.; Bonfils, S. (INSERM U-10, Hopital Bichat, 170, boulevard Ney, F-75877 Paris Cedex 18, France). *Gastroenterol. Clin. Biol.* 1(5):425-434; 1977.

Secretin provocation tests were administered to 20 patients; 12 with confirmed and 8 with suspected Zollinger-Ellison syndrome. Secretin (3 U/kg, i.v.) was infused during a 60-min period after 60 min of basal observation. Serum gastrin levels and acid secretion were measured every 15 min. There was a significant increase in serum gastrin in 9/12 confirmed Zollinger-Ellison cases and in 6/8 suspected cases. Acid secretion was significantly increased in five of nine patients, but the results did not pa allel gastrin increases in four cases. It is conclu that the secretin provocation test may be a valuable diagnostic aid, although the results are not as informative in patients who have recurrent ulcers after a partial gastrectomy as in patients who have undergone no prior surgery.

5942 A NONSURGICAL APPROACH TO THE TREATMENT OF UPPER GASTROINTESTINAL HEMORRHAGE: A PRELIMINARY REPORT. (Eng.) Mormino, J.; Taft, F.; Powers, S. R. (11 Ralph Place, Suite 308, Staten Island, NY 10304). *Mt. Sinai J. Med.* 44(2):269-276; 1977.

5943 COMPLICATIONS ASSOCIATED WITH THE USE OF GASTROINTESTINAL STAPLING DEVICES. (Eng.) Wassner, J. D.; Yohai, E.; Heimlich, H. J. (Jewish Hosp. Cincinnati, Cincinnati, OH 45229). *Surgery* 82(3):395-399; 1977.

5944 EFFECT OF INFECTION ON NUTRIENT REQUIREMENTS. (Eng.) Scrimshaw, N. S. (Dept. Nutrition and Food Science, Massachusetts Inst. Technology, Cambridge, MA 02139). *Am. J. Clin. Nutr.* 30(9):1536-1544; 1977.

5945 SECRETIN: HIGH PLASMA LEVELS IN DIABETES MELLITUS. (Eng.) Trimble, E. R.; Buchana K. D.; Hadden, D. R.; Montgomery, D. A. D. (Royal Victoria Hosp., Belfast BT12 6BA, Northern Ireland). *Acta Endocrinol.* 85(4):799-805; 1977.

5946 AN EXPERIENCE WITH TOTAL PARENTERAL NUTRITION IN CHILDREN. (Eng.) Keating, J. P. Schwarz, K. B.; Bell, M. J.; Ternberg, J. L. (St. Louis Children's Hosp., 500 S. Kingshighway Blvd., St. Louis, MO 63310). *Am. J. Clin. Nutr.* 30(9): 1506-1509; 1977.

5947 LEUKOCYTE ELECTROLYTES AND SODIUM TRANSPO IN PROTEIN ENERGY MALNUTRITION. (Eng.) Patrick, J.; Golden, M. (Tropical Metabolism Res. Unit, Univ. West Indies, Kingston 7, Jamaica). *Am. J. Clin. Nutr.* 30(9):1478-1481; 1977.

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5949 IMMUNOTHERAPY OF GASTROINTESTINAL CANCER: THE POTENTIAL. (Eng.) Sparks, F. C.; Ramming, K. P. (No affiliation given). *Clin. Gastr enterol.* 5(3):855-868; 1976.

5950 MANAGEMENT OF PRECANCEROUS LESIONS OF THE GASTROINTESTINAL TRACT. (Eng.) Levin, B.; Riddell, R. H.; Kirsner, J. B. (No affiliation given). *Clin. Gastroenterol.* 5(3):827-853; 1976.

5951 INFECTION AND THE DEVELOPMENT OF KWASHIORKOR AND MARASMUS IN AFRICA. (Eng.) Whitehead, R. G. (Dunn Nutrition Unit, Milton Rd., Cambridge, CB4 IXJ, England). *Am. J. Clin. Nutr.* 30(8): 1281-1284; 1977.

5952 CYSTS AND CONGENITAL LESIONS OF THE PAROTID GLAND. (Eng.) Work, W. P. (Univ. Michigan Medical Center, Ann Arbor, MI 48109). *Otolaryngol. Clin. North Am.* 10(2):339-343; 1977.

5953 IMMUNOLOGIC DISEASES OF THE SALIVARY GLANDS. (Eng.) Deegan, M. J. (Univ. Michigan Medical Center, 1335 East Catherine St., Ann Arbor, MI 48109). *Otolaryngol. Clin. North Am.* 10(2):351-361; 1977.

5954 SALIVARY GLAND NEOPLASMS AS A LATE CONSEQUENCE OF HEAD AND NECK IRRADIATION. (Eng.) Schneider, A. B.; Favus, M. J.; Stachura, M. E.; Arnold, M. J.; Frohman, L. A. (Michael Reese Hosp. and Medical Center, 29th St. and Ellis Ave., Chicago, IL 60616). *Ann. Intern. Med.* 87(2)):160-164; 1977.

5955 USE OF AN EXTERNAL BYPASS TECHNIQUE IN GASTROINTESTINAL AND BILIARY SURGERY. (Eng.) Zer, M.; Mukamel, E.; Dintsman, M. (Beilinson Medical Center, Petah Tikva, Israel). *World J. Surg.* 1(4):535-537; 1977.

See also, 5493, 5508, 5518, 5543, 5566, 5578, 5610, 5612, 5633, 5638, 5649, 5654, 5655, 5674, 5681, 5689, 5699, 5708, 5718, 5727.

GENERAL

Parasitology

5956 PERFORATION OF HYDATID CYST INTO THE COMMON BILE DUCT: REPORT OF FOUR CASES. (Eng.) Man, B.; Kraus, L.; Motovic, A. (Meir Hosp., Tel Aviv, Israel). *Trop. Geogr. Med.* 29(1):95-98; 1977.

Four cases of hydatid cysts that perforated into the common bile duct are presented. The patients ranged in age from 22 to 39 yr. Jaundice was present in three cases, and fever, vomiting, and right upper abdominal pain were other presenting symptoms. Eosinophilia was present in three cases, and other laboratory findings were consistent with obstructive jaundice. The surgical treatment consisted of choledochotomy, evacuation of the daughter cysts in the common bile duct and of the echinococcosis mother cyst, and drainage through a T-tube. In one case, it was possible to open the mother cyst, evacuate its contents, and drain it externally. Perforation of a hydatid cyst into the common bile duct is an important complication, as it may present as an unsuspected cause of obstructive jaundice.

5957 NEMATODE LARVAE (SPIRURIDA [sic]: Physalopteridae) CAUSING INFARCTION OF THE BOWEL IN AN INFANT. (Eng.) Nicolaides, N. J.; Musgrave, J.; McGuckin, D.; Moorhouse, D. E. (Wickham Terrace, Brisbane, Australia). *Pathology* 9(2):129-135; 1977.

The case is reported of an 11-month-old boy with gangrene of the distal small bowel due to infestation by larval worms belonging to the order Spirurida, family Physalopteridae, and probably the genus *Physaloptera*. The initial symptoms included vomiting and a fleeting cutaneous rash. Microscopically, the resected bowel showed ischemic necrosis, eosinophilic granulomata, and larval worms in the lumen and wall of blood vessels. The inflammatory process extended into the mesentery, where the vessels showed focal necroses, thrombosis, and endarteritis. Infection in this child in the Queensland countryside is considered to have resulted from ingestion of insects on grass eaten when at play, the grass having been contaminated by bandicoots.

5958 FASCIOLICIDAL ACTIVITY OF CARBONYL DICYANIDE PHENYLHYDRAZONES. (Eng.) Brown, G. R.; Coles, G. C.; Hayes, A. (Imperial Chemical Industries Ltd., Pharmaceuticals Div., Alderly Park, Macclesfield, Cheshire, England). *Eur. J. Med. Chem.* 12(4):361-363; 1977.

5959 4-AMINO-6-(TRICHLOROETHENYL)-1,3-BENZENE-DISULFONAMIDE, A NEW, POTENT FASCIOLICIDE. (Eng.) Mrozik, H.; Bochis, R. J.; Eskola, P.; Matzuk, A.; Waksmunski, F. S.; Olen, L. E.; *et al.* (Merck Sharp & Dohme Res. Lab., Rahway, NJ 07065). *J. Med. Chem.* 20(9):1225-1227; 1977.

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5961 GIARDIASIS. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6086):538-539; 1977.

5962 Taenia INFESTATION OF AN APPENDIX ABSCESS. (Eng.) Krukowski, Z. H.; Miller, S. S. (Dept. Surgery, Aberdeen Univ., Aberdeen, Scotland). *J. R. Coll. Surg. Edinb.* 22(3):221-223; 1977.

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5964 THE PATHOLOGY OF SCHISTOSOMIASIS IN SUDAN. (Eng.) El Hassan, A. M.; Satir, A. A.; Ahmed, M. A.; Omer, A. (Inst. Tropical Medicine, Khartoum, Sudan). *Trop. Geogr. Med.* 29(1):56-64; 1977.

5965 HYDATIC CYSTS OF THE LIVER. (Eng.) Bakran, I. (Surgery Clinic, Univ. Zagreb, Zagreb, Yugoslavia). *Abdom. Surg.* 19(3):74-75; 1977.

5966 EFFICACY OF VARIOUS DRUGS FOR TREATMENT. OF GIARDIASIS: A COMPARATIVE STUDY. (Eng.) Levi, G. C.; Armando de Avila, C.; Neto, V. A. (Hospital do Servidor Publico, Estadual "Francisco Morato de Oliveira," Sao Paulo, Brazil). *Am. J. Trop. Med. Hyg.* 26(3):564-565; 1977.

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5968 PROTEOLYTIC, ANTIGENIC AND IMMUNOGENIC PROPERTIES OF Schistosoma mansoni CERCARIAL SECRETION MATERIAL. (Eng.) Minard, P.; Murrell, K. D.; Stirewalt, M. A. (Naval Medical Res. Inst., Bethesda, MD 20014). *Am. J. Trop. Med. Hyg.* 26(3):491-499; 1977.

5969 PREVALENCE AND INTENSITY OF Schistosoma haematobium AND S. mansoni INFECTION IN QALYUB, EGYPT. (Eng.) El Alamy, M. A.; Cline, B. L. (Tulane Medical Center, 1430 Tulane Ave., New Orleans, LA 70112). *Am. J. Trop. Med. Hyg.* 26(3):470-472; 1977.

5970 REPORT OF THE AMERICAN SCHISTOSOMIASIS DELEGATION TO THE PEOPLE'S REPUBLIC OF CHINA. (Eng.) Basch, P. F.; Bruce, J. I.; Bueding, E.; Bullock, M. B.; Cohen, M. L.; Elslager, E. F.; *et al.* (Committee on Scholarly Communication with the People's Republic of China, Natl. Academy Sciences, 2101 Constitution Ave., Washington, DC 20418). *Am. J. Trop. Med. Hyg.* 26(3):427-455; 1977.

5971 EFFECTS OF LEAD ON WORKERS LIVING IN AREAS WITH HIGHLY ENDEMIC INTESTINAL HELMINTHIASIS. (Eng.) Mendes, R. (Escola Paulista de Medicina, Rua Botucatu, 720, Sao Paulo, Brazil). *J. Occup. Med.* 19(7):498-499; 1977.

5972 MYOFIBROBLASTS IN HEPATIC SCHISTOSOMAL FIBROSIS. (Eng.) Grimaud, J. A.; Borojevic, R. (Institut Pasteur, 77, rue Pasteur, F-69365 Lyon, France). *Experientia* 33(7):890-892; 1977.

5973 1,4-BIS-[1-METHYL-5-NITROIMIDAZOLYL-(2-METHYLENEIMINO)]-PIPERAZINE, A NEW DRUG WITH MARKED ACTIVITY AGAINST Entamoeba histolytica. (Eng.) Raether, W.; Seidenath, H.; Winkelmann, E. (Hoechst Aktiengesellschaft, Postfach 80 03 20, 6230 Frankfurt/Main 80, W. Germany). *Arzneim. Forsch.* 27(5):968-969; 1977.

5974 THE IMMUNOLOGICAL DIAGNOSIS OF HUMAN HYDATID DISEASE. (Eng.) Matossian, R. M. (London Sch. Hygiene and Tropical Medicine, London, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(2):105-108; 1977.

5975 HYDATID DISEASE IN WALES. (Eng.) Walters T. M. H. (Ministry of Agriculture, Fisheries and Food, "Belgrave," Spa Rd., Llandrindod Wells Powys, LD1 5HA, Wales). *Trans. R. Soc. Trop. Med. Hyg.* 71(2):105-108; 1977.

5976 AN EPIDEMIOLOGICAL INVESTIGATION OF TWO OUTBREAKS OF GIARDIASIS IN VERMONT DURING 1974. (Eng.) Witherell, L. E.; Herbert, L. M. (Environmental Protection Agency). *J. N. Engl. Water Works Assoc.* 91(2):102-118; 1977.

See also, 5436, 5485, 5486, 5487, 5489, 5496, 5497, 5504, 5506, 5507, 5508, 5509, 5686, 5690, 5833, 5834, 5944, 5948, 5955.

Regional Enteritis

5977 EVIDENCE FOR A TRANSMISSIBLE FACTOR IN CROHN'S DISEASE. (Eng.) Donnelly, B. J.; Delaney, P. V.; Healy, T. M. (Dept. Surgery, Univ. Coll., Dublin, Ireland). *Gut* 18(5):360-363; 1977.

To investigate the possibility that a transmissible factor exists in Crohn's disease, rabbit ileum was injected with normal and Crohn's-affected human bowel homogenates, and the effects of adding ampicillin to the homogenates were investigated. Crohn's-like changes were present 6 months after the injection of normal human bowel in 7 of 11 rabbits and after the injection of human Crohn's tissue in 4 of 16 rabbits; 12 months after the injection, the rabbit bowel had reverted to normal. The addition of ampicillin (125,000 U/ml) to the homogenates prevented the appearance of these Crohn's-like changes in all of six animals injected with normal human bowel and in all of six animals injected with Crohn's tissue. These results suggest that a transmissible factor present in both normal and Crohn's-affected bowel is involved in the etiology of Crohn's disease.

5978 TREATMENT OF RECTOCOLONIC CROHN'S DISEASE BY IMMUNODEPRESSIVE DRUGS. (Fre.) Delmont, J.; Vedel, J. P.; Faure, X.; Rampal, P. (Hopital du Cimiez, 4, av. Reine-Victoria, 06000 Nice, France). *Ann. Gastroenterol. Hepatol.* 13(4): 347-355; 1977.

A series of 19 patients with confirmed Crohn's disease were treated by a combination of azathioprine and cortisone for 6 months and were evaluated at 1 month, 6 months, and 1, 2, and 3 yr. Cortisone was given as 40 mg the first half month, 30 mg the second half month, 20 mg the second month, 15 mg the third month, and 10 mg for 3 months following. Azathioprine was given as three tablets for 1 month and 2 tablets for the 5 subsequent months. All the patients showed a good improvement 1 month after the treatment started, and 17/19 were still improved after 6 months. After 2 yr, only 6/14 patients were still well without any further treatment, 6/14 patients remained symptomless on a maintenance dose of the drugs, 2/14 needed surgical treatment, and 1 patient died; reports for 4 patients were unavailable. At 3 yr, seven patients on a maintenance dose showed good results, and three patients not continuing treatment showed good results; results were unavailable for seven patients. These results seem to indicate that the value of azathioprine may lie in its ability to lower the effective dose of jointly administered cortisone.

5979 ENZYMATIC AND MORPHOMETRIC EVIDENCE FOR CROHN'S DISEASE AS A DIFFUSE LESION OF THE GASTROINTESTINAL TRACT. (Eng.) Dunne, W. T.; Cooke, W. T.; Allan, R. N. (Dept. Biological Science, Univ. Aston in Birmingham, Birmingham, England). *Gut* 18(4):290-294; 1977.

Studies were carried out in patients with distal Crohn's disease to determine whether changes in jejunal mucosal enzymes in these patients support the concept of Crohn's disease as a diffuse lesion of the gastrointestinal tract. Intestinal disaccharidase and dipeptidase activities were measured in mucosal biopsies from the proximal jejunum in 20 patients with Crohn's disease apparently confined to the distal ileum or large bowel, 14 control patients with ulcerative colitis, and 14 healthy controls. The dissecting microscopy and histological appearance of all of the biopsies were normal (grades 0-1), except for those of two patients with Crohn's disease and one patient with ulcerative colitis, which showed grade 2 changes. Biopsy morphometry showed a reduction of jejunal mucosal surface area and an increase in mucosal volume in patients with Crohn's disease when compared with the other two groups. The mucosal enzymes studies demonstrated that patients with Crohn's disease had a significant reduction in brush border enzymes (disaccharidase), but no change in cytoplasmic enzyme activity (dipeptidases). All three disaccharidases (lactase, trehalase, and sucrase) were significantly reduced in the patients with Crohn's disease, compared with the other two groups. The enzyme levels in patients with ulcerative colitis did not differ from the healthy controls. The reduction of brush border enzymes with normal cytoplasmic enzymes in the presence of abnormal morphometry is further evidence of the concept of Crohn's disease as a diffuse lesion of the gastrointestinal tract. It also suggests that there is either specific damage to the microvilli or some other abnormality such as impairment of enzyme synthesis in Crohn's disease.

5980 CROHN'S DISEASE OF THE DUODENUM. (Eng.) Nugent, F. W.; Richmond, M.; Park, S. K. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Gut* 18(2):115-120; 1977.

A review of 36 patients with Crohn's disease involving the duodenum is presented. Crohn's disease elsewhere in the gastrointestinal tract was seen in 32 of these patients. Upper abdominal pain and symptoms of gastroduodenal obstruction were the commonest symptoms of presentation. Significant weight loss was common, and occasionally major upper gastrointestinal bleeding occurred. The commonest radiologic pattern of involvement (20 patients) was contiguous involvement of the gastric antrum and proximal duodenum. The earliest radiologic features were irregular thickening, edema, and a cobblestone pattern of the mucosa. As the disease progressed, stenosis became a prominent finding. Eventually, stenosis became severe, and a string sign developed. Endoscopically, diffuse granularity, nodularity, and ulceration were seen accompanied by a lack of distensibility of the involved area.

Twelve patients had all of the histological features of Crohn's disease, including granulomas. However, granulomas were not demonstrated in any of 17 patients who had endoscopic biopsies, and only one of three capsule biopsies performed demonstrated granulomas. Operative bypass was carried out in 18 patients, with gastroenterostomy and vagotomy being performed in six patients, gastroenterostomy in six patients, Billroth II procedure and vagotomy in three patients, Billroth II procedure in two patients, and duodenojejunostomy in one patient. After an average follow-up of 6.6 yr (range, 1-19 yr), 15 of these patients are free of all significant upper gastrointestinal symptoms. When symptoms of obstruction dictate, operative bypass is accompanied by favorable long-term results in the large majority of patients.

5981 PROBLEMS RELATED TO A PATIENT WITH CROHN'S DISEASE COMPLICATED BY ANAL FISTULA AND TWO BIPOLAR EPIDERMOID CARCINOMAS OF THE ANAL MARGIN. (Fre.) Pradel, E.; Rodier, B. (Hopital St.-Joseph, 7, rue Pierre-Larousse, 75014 Paris, France). *Ann. Gastroenterol. Hepatol.* 13(4):307-310; 1977.

The case of a 36-yr-old man with ileocecal Crohn's disease who developed an anal fistula after 11 yr and two successive epidermoid carcinomas of the anal margin 16 yr after hemicolectomy is reported. For 6 yr, he had been receiving continuous low doses of corticosteroids for spondylarthritis. The fistula was routinely corrected. The first carcinoma was treated by cobalt therapy, 8,270 rads to the anal area and 3,630 rads to each of the two oblique posterior areas. Five months later, another anal epidermoid carcinoma, without perceptible adenopathy, was discovered; it was widely extirpated. Immunologic studies showed a normal cellular immunity and a lowered lymphocyte reactivity. The patient was strongly hypersensitive to pneumoallergens and was negative for anticolon antibodies. Since the patient showed no further sign of cancer, it was decided not to resort to any chemotherapy or immunotherapy for the present. This is the first reported case of epidermoid carcinoma complicating Crohn's disease.

5982 MICROGRANULOMAS IN GROSSLY NORMAL RECTAL MUCOSA IN CROHN'S DISEASE. (Eng.) Rotterdam, H.; Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., 100 East 77th St., New York, NY 10021). *Am. J. Clin. Pathol.* 67(6):550-554; 1977.

Rectal biopsies of sigmoidoscopically normal mucosa from 99 patients with Crohn's disease of the ileum, colon, or both were studied histologically, with particular reference to the presence of granulomas. A total of 23 granulomas were found in six patients with Crohn's disease of the colon, four with ileocolitis, and four with ileitis. Eleven granulomas were of the usual sarcoid type and were easily detected under low-power microscopy. They varied in diameter from 250-660 μm, with an average of 500 μm. Twelve microgranulomas were of loose composition and were recognized only under high power microscopic examination. They ranged in diameter from 125-200 μm, with an average of 180 μm. All patients who had granulomas had clinically active disease, while most patients with microgranulomas had clinically inactive disease. Five granulomas were located in the middle third of the mucosa, four in the lower third near the muscularis, and two in the submucosa. Eight microgranulomas were located in the upper third of the mucosa near the surface, two in the middle third, and two in the lower third. The finding of microgranulomas in patients with both colonic and ileal involvement in Crohn's disease indicates the need to examine carefully every serial section and emphasizes that not every granuloma in Crohn's disease has the typical mature, sarcoid-like appearance. The superficial mucosal location of the majority of microgranulomas indicates that colonic microgranulomas do not arise in lymphatic walls.

5983 RECTAL BIOPSY IN PATIENTS WITH CROHN'S DISEASE: NORMAL MUCOSA ON SIGMOIDOSCOPIC EXAMINATION. (Eng.) Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., 100 E. 77th St., New York, NY 10021). *JAMA* 237(25):2742-2744; 1977.

The question of whether histologic abnormalities are common enough in the sigmoidoscopically normal rectal mucosa of patients with ileal or colonic Crohn's disease to justify a routine rectal biopsy in these patients was investigated. Of 99 patients whose rectal segment was endoscopically normal, there was histologic inflammation in 45% and features characteristic of Crohn's disease in 30% of rectal biopsy specimens. Granulomas occurred in 18% of the patients, including 13% of those with ileitis, 13% of those with ileocolitis, and 37% of those with colitis. Eleven of the 17 granulomas were small, undemarcated microgranulomas. Rectal biopsy specimens are valuable in the confirmation of the diagnosis of Crohn's disease and in the determination of the state of clinical activity even when the sigmoidoscopic appearance is normal.

5984 ISOLATED HUMAN INTESTINAL MUCOSAL LYMPHOID CELLS: ALTERATIONS IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Bookman, M. A.; Helms, R. A.; Bull, D. M. (Harvard Medical Sch. at Beth Israel Hosp., Boston, MA). *Gastroenterology* 72 (5, Part 2):1155; 1977.

5985 CROHN'S DISEASE INVOLVING THE ESOPHAGUS AND COLON: CASE REPORT. (Eng.) Miller, L. J.; Thistle, J. L.; Payne, W. S.; Gaffey, T. A.; O'Duffy, J. D. (Mayo Graduate Sch. Medicine, Rochester, MN). *Mayo Clin. Proc.* 52(1):35-38; 1977.

5986 ADENOCARCINOMA OF THE SMALL INTESTINE IN CROHN DISEASE INVOLVING THE SMALL BOWEL. (Eng.) Burbige, E. J.; Bedine, M. S.; Handelsman, J. C. (Veterans Admin. Hosp., 150

Muir Rd., Martinez, CA 94553). *West. J. Med.* 127(1):43-45; 1977.

5987 COMPLEMENT ACTIVITY IN INFLAMMATORY DISEASES OF THE COLON. (Fre.) Giroux, Y.; Boileau, J.; Mignon, M. F. (Hopital Maisonneuve-Rosemont, Montreal, Canada). *Union Med. Can.* 105 (11):1681-1685; 1977.

5988 STUDIES ON INFLAMMATORY BOWEL DISEASE. (Eng.) Nugent, F. W. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Mt. Sinai J. Med.* 44(2):167-173; 1977.

5989 LONG-TERM RESULTS IN THE TREATMENT OF REGIONAL ILEITIS WITH COHERIN. (Eng.) Hiatt, R. B.; Goodman, I. (Columbia Univ. Coll. Physicians and Surgeons, 630 W. 168th St., New York, NY 10032). *Am. J. Gastroenterol.* 67(3):274-277; 1977.

See also, 5513, 5548, 5604, 5665, 5748, 5757, 5760, 5762, 5764, 5765, 5767.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

ABASOV, I.T.
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